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Centralized Commissary Concept

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The Air Force Engineering & Services Quarterly is an official nondirective Headquarters US Air Force publication, published quarterly under provisions of Chapter 2, AFM 5-1. Its purpose is to provide Air Force Civil Engineering and Services personnel with a timely and comprehensive picture of the importance, wide ranging involvement and direct relationship of civil engineering and services activities to successful accomplishment of the Air Force mission. It provides current information about significant civil engineering and services programs and accomplishments throughout the Air Force; pertinent developments in science engineering and management; and educational/training opportunities for enhancing professional thought and development. The Quarterly is edited and published by the Civil Engineering School, Air Force Institute of Technology. Contributions, suggestions and criticism are welcome. Opinions expressed do not necessarily reflect the official viewpoint of the Department of the Air Force, the Director of Engineering & Services or the editorial staff.

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Maj Gen Robert C. Thompson
Director
Engineering & Services

From the Director

Service: Special Obligations...and Opportunities

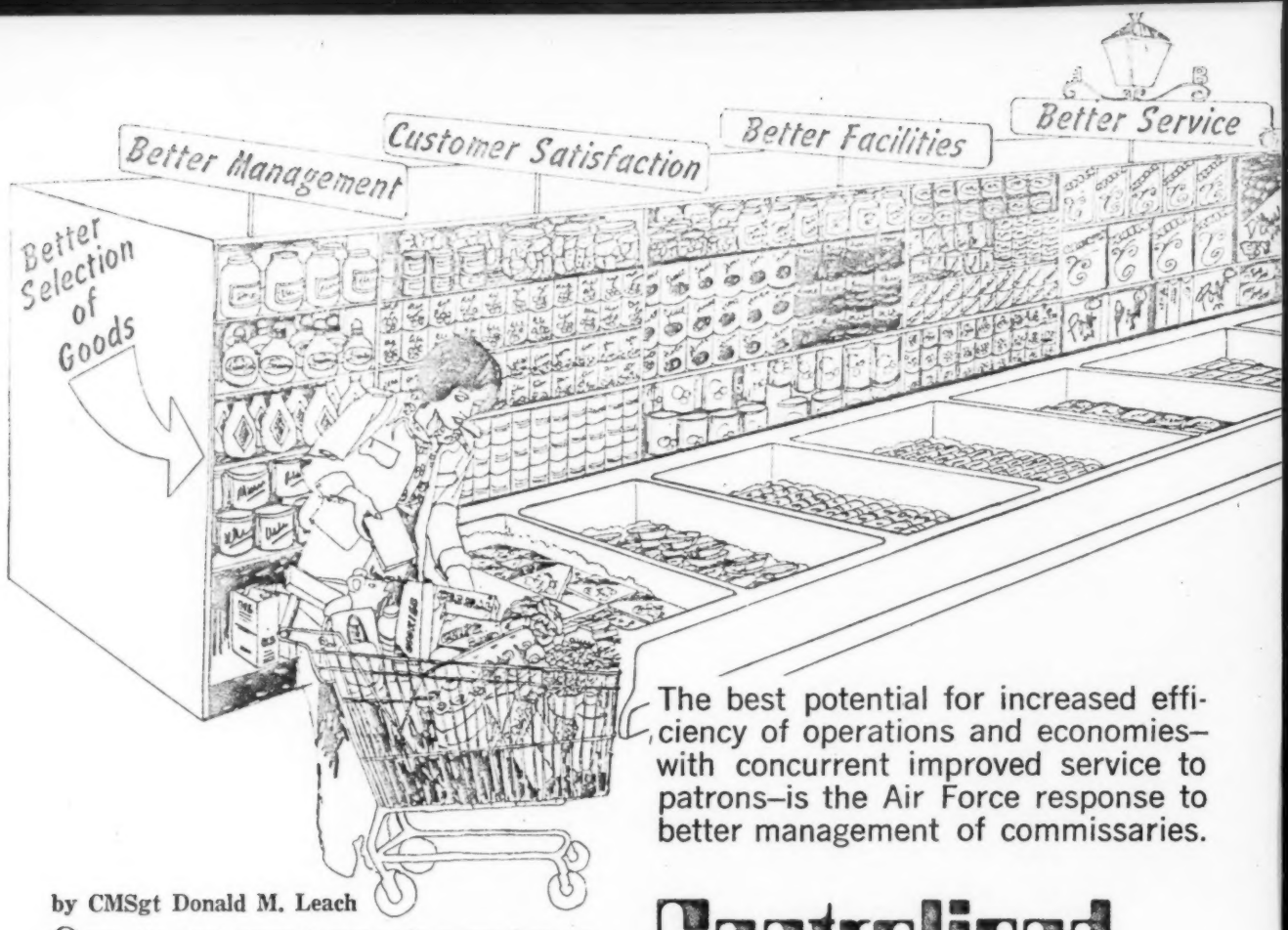
In conversations with many of you, I have often mentioned that Air Force engineers have long been engaged in providing "services." We have always been responsible for building and maintaining those facilities, homes, offices, recreation facilities, shops, schools, etc.—from which services are provided. Recognizing our fundamental involvement in services, the Air Force has added to our responsibilities the management of many service type functions—the result Engineering and Services. Engineers and Services personnel who provide these services to Air Force people have some special obligations—and opportunities:

- Engineers must do more than build and maintain. They must insure that what is built satisfies the needs of our people. Our products must be functional, they must look good, they must be maintainable and they should be something in which we all take pride.
- We should constantly seek better ways to respond to the needs of Air Force people—to provide service.
- We should insure that the customer always receives from us the very best product we are capable of producing.
- We must be aware of what's happening on our bases. Are the service facilities used in the best interest of our people? Are the operating hours geared to customer needs? Do we have the right stock on the shelves when the customer wants it? Do our employees have the attitude that the customer comes first? They should. In order to be sure of the answers we must get out from behind the desk—move around the base—become involved.
- We must be aware at all times that we are judged by the product we produce—the service we provide. The people we serve are the ones who render that judgment.
- We should actively seek ways to support the commander, the people and thus the mission.
- We must be concerned, we must care—be concerned that the interests of the Air Force are best served and care that the needs of our people are satisfied to the best of our abilities.

It is interesting to note that the views expressed above are shared by many of our senior Air Force commanders. At our recent Air Force Engineering and Services Conference, held at Homestead AFB, in early December of last year, General Russell E. Dougherty, Commander in Chief, Strategic Air Command, expressed his views concerning the need for concerned, people-oriented Air Force managers. You will find his comments printed in this issue of the **Engineering & Services Quarterly.**

Robert C. Thompson

ROBERT C. THOMPSON
Major General, US Air Force
Director of Engineering & Services



The best potential for increased efficiency of operations and economies–with concurrent improved service to patrons–is the Air Force response to better management of commissaries.

Centralized Commissary Concept

by CMSgt Donald M. Leach

Over the past several years, Congress has expressed concern to the Department of Defense (DOD) over the need to improve the management of military commissaries. The Office of Management and Budget and the General Accounting Office have both recommended that changes be made to the military commissary systems to improve management.

In March 1975, the Air Force completed a study on possible alternatives for improving the management of Air Force commissaries. From the study, the Air Force determined that a centralized management system offered the best potential for increased efficiency of operations and economies—with concurrent improved service to patrons of the commissaries. This concept was termed a Centralized Commissary System and what it entails is the removing of the management responsibilities of Air Force commissaries from the major air commands and the bases and placing the stores under the direction of a single manager.

DOD also completed a study in June 1975, and as a result, it recommended that the military services develop Centralized Commissary Systems. The next month, in a memorandum to the Secretaries of the Military Services, OASD (M&RA) approved the recommendations of the DOD study and directed the Army and Air Force to implement a Centralized Commissary System. The memorandum included the directive that no additional manpower spaces would be utilized and the Headquarters of the Centralized Commissary System could not be located in the Washington DC area. Prior to this memorandum, the Air Force Chief of Staff had directed the formation of a Planning Group to develop an Implementation Plan for a Centralized Commissary System.

HOW WILL IT OPERATE?

The Planning Group determined that the commissary System could best be managed by a separate operating agency under the direction of a Board of Directors. The Air Force Commissary Service (AFCOMS) was then established and ap-

proved by the Secretary of the Air Force on 18 December 1975 and activated on 1 January 1976. On 5 January 1976, a Task Force was convened at Headquarters US Air Force to implement AFCOMS. This Task Force was drawn from various commands, individual bases and the Air Staff to perform the myriad tasks necessary to get AFCOMS operational until the initial cadre of 33 personnel came on board 1 April 1976. The initial cadre will continue working to finalize the establishment of the Headquarters and Regional offices. Between 1 June and 1 October 1976, the organization will continue to flesh out until AFCOMS assumes control of the worldwide operation on 1 October 1976.

The Director of Engineering and Services will serve as Chairman of the Board of Directors. Members of the Board will be composed of the Commander of AFCOMS along with a general officer designated by the Air Force Comptroller, DCS/Personnel, DCS/Systems and Logistrics, Commander of Air Force Logistics Command, and one other position that will be filled alternately for one year periods by the major air commands. The Board directs AFCOMS, approves basic policies, plans and programs, and approves the annual financial plans and goals governing worldwide operations of commissary services.

WHERE AND WHO WILL OPERATE IT?

Headquarters AFCOMS is located at Kelly AFB, Texas. The Commander, Maj Gen Daniel Burkett, operates through four Regional Offices, **Figure 1:**

- **WESTERN REGION AT NORTON AFB, CALIFORNIA:** Col Leland E. Maines, Jr, will be responsible for all stores in the Pacific area and in the states of Alaska, Hawaii, Washington, Oregon, Idaho, Nevada, Arizona and California.
- **CENTRAL REGION AT KELLY AFB, TEXAS:** Col Leroy T. Salem will be responsible for stores in the states of Montana, Wyoming, North Dakota, South Dakota, Nebraska, Iowa, Utah, Colorado, Kansas, Missouri, New Mexico, Oklahoma, Louisiana, Arkansas and Texas.
- **EASTERN REGION AT MCGUIRE AFB, NEW JERSEY:** Col William F. Cocke will be responsible for the balance of the states in the CONUS.
- **EUROPEAN REGION AT RAMSTEIN AB, GERMANY:** Col Fleming A. Cheek will be responsible for all stores in Europe and the Mediterranean area.

Plans have been formulated to place administration of commissary stores located in geographical proximity under a single manager. The resultant

Figure 1: Air Force Commissary Service Regional Offices.

groups of consolidated commissaries will be called complexes. Complexing will begin with the 18 commissaries listed in **Figure 2**, which will be joined into nine complexes, and later will spread to other areas and to complexes with more than two stores. The Headquarters, Regions, complexes and commissaries will be tenants on installations; however, they will be responsive to the Base Commander on such matters as hours of operation, patronage control and complaints.

The manpower spaces for AFCOMS will be derived from commissary slots at the present Air Force Services Office and major command headquarters staffs and from the savings achieved by the complexing of stores. In order to keep the Air Force Services Office and the major commands operational until AFCOMS assumes control, the manpower authorizations to establish AFCOMS have been drawn from unencumbered (vacant) slots at base level (individual stores).

AFCOMS will be a lean and mean organization. It plans a headquarters staff of 93 personnel with 21 in each Region except for Europe which will have 19. With only 175 people to manage stores at some 164 locations, it is easy to see that there is not going to be room for any excess baggage in the system. Accordingly, the Headquarters and Regions are organized for maximum efficiency, **Figure 3.** Headquarters will have five divisions: Administration, Comptroller, Policy/Plans/Programs/Engineering, Personnel, and Operations. Each Region will have three branches: Control, Operations and Engineering Support.

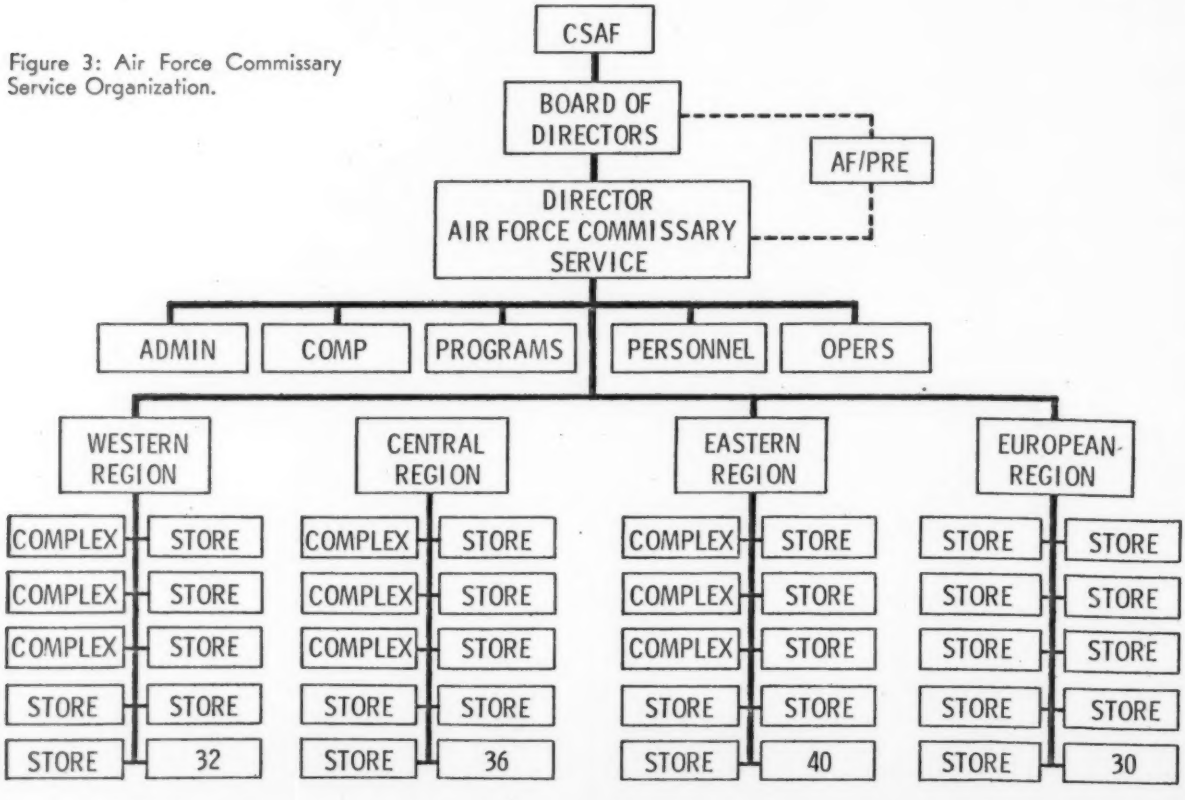
Figure 2: Commissaries to be Complexed.

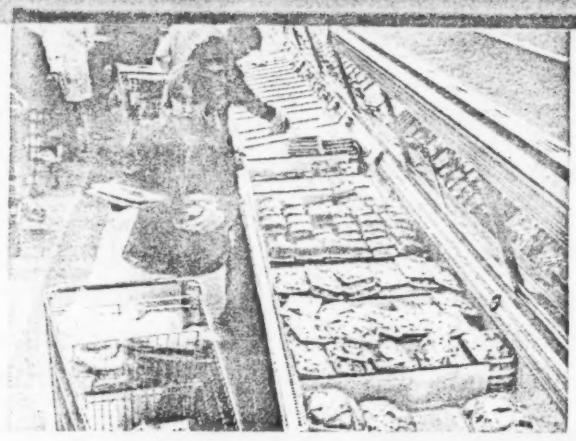
McClellan AFB, California	Maxwell AFB, Alabama
Mather AFB, California	Gunter AFB, Alabama
Norton AFB, California	Eglin AFB, Florida
March AFB, California	Hurlburt Field, Florida
Ent AFB, Colorado	Andrews AFB, DC
USAF Academy, Colorado	Bolling AFB, DC
Randolph AFB, Texas	Williams AFB, Arizona
Brooks AFB, Texas	Luke AFB, Arizona
Lackland AFB, Texas	
Kelly AFB, Texas	

THINGS TO COME

The initial effects of AFCOMS will not be immediately apparent to customers. As AFCOMS becomes fully operational and the complexing begins, signs of the centralized system will start showing up at the source. With the complexing, greater purchasing power will result in different

Figure 3: Air Force Commissary Service Organization.





Shoppers at the McChord AFB commissary enjoy the convenience of pre-packaged meats in well-lighted display cases.

geographical locations. This may not drastically reduce prices, but it should furnish a good hedge on inflation.

AFCOMS also includes specialists in meat, produce and grocery merchandising. These specialists will be working with the regions, complexes and stores to improve the way products are displayed and presented to the patrons. AFCOMS' in-house engineering expertise will develop the most efficient and productive layouts for stores as well as incorporating the latest state-of-the-art design in merchandising equipment. Centralized management and control will also provide a more standardized approach to facility improvements and operations which will result in the stores needing improvements receiving the proper attention.

For the first time since the first Air Force Commissary opened its doors, centralized management will provide the vehicle for much faster response to the customer's needs along with the ability to take full advantage of what industry has to offer. Centralized and direct control will also remove any of the excuses and reasons for the wide disparity of service offered from store to store. In essence, AFCOMS will strive to provide fuller, better merchandized shelves with comparable or better prices to the customers at a cheaper operating cost to the US Government.

Congressional guidance as well as the media have made all of us fully aware that the pressure is on to improve the military commissary systems. If commissary management is not improved to operate more efficiently—at reduced cost and without degradation of service to the patrons—the stores may well be lost. While AFCOMS will have its share of growing pains, it is the Air Force intention to maintain efficient service to the patron at a reduced operating cost. With the support of everyone concerned, from the AFCOMS Board of Directors to the employees in the stores, and along with our customers, AFCOMS will provide real meaning to the phrase, "A better way of doing business."

E&S

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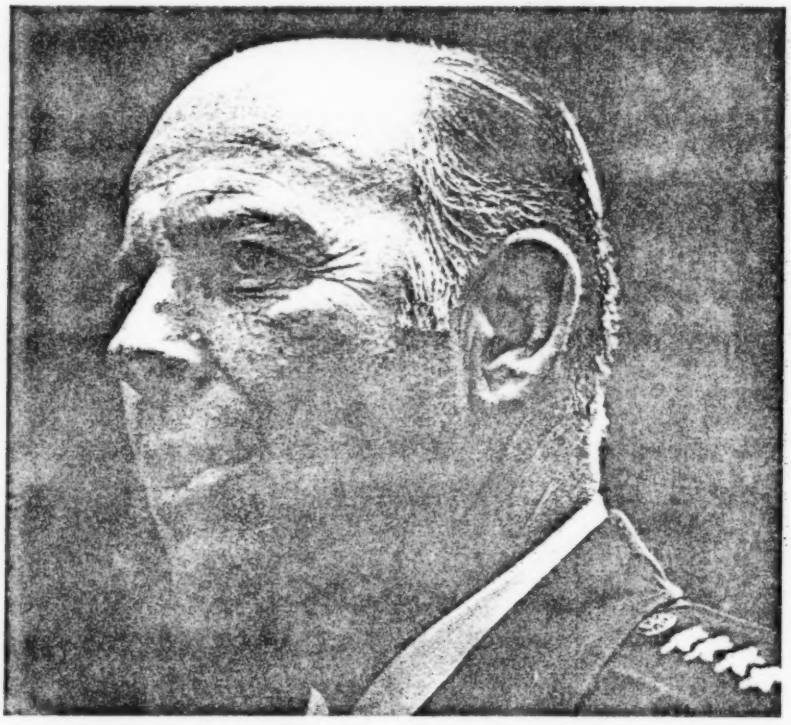
Shoppers crowd the well-stocked shelves of the McChord AFB comstore.

At Lackland AFB, customers shop in the new comstore opened in July 1975. It has 3000 SF more of sales area.

Air Force patrons browse the well-stocked produce displays in McChord AFB's new food emporium, opened in February 75.

SERGEANT LEACH *is a member of the Civil Engineering and Services Management Evaluation Team, Headquarters US Air Force on special loan to the AFCOMS Task Force. In his 21 years of service in the Air Force, he has held numerous base level, dual base/major command and major command management positions. He is a graduate of several enlisted military schools.*

. . . how wonderful to have people-oriented engineers in a mission that is so intensely people-oriented, to have mission and people-oriented doctors, lawyers, administrators. Mission and people-oriented officers in our service will insure our future. We have a great opportunity before us today. I think it has taken 27 years to begin to put things into perspective . . . and we're off and running!



Make service your profession

by Gen Russell E. Dougherty

I received a letter at the beginning of my assignment as the eighth Commander in Chief of the Strategic Air Command (SAC) from a person who many of you will know, Maj Gen Richard Yudkin, USAF Retired. In it Dick said: "I've known well every Commander in Chief of SAC and each has been different . . . but you're the most different!"

I suppose that's true . . . though I'm not sure what he was implying! I've respected and worked for every one of my predecessors at one time or another and, yes, we're different—but vive la difference!

I have been proud of my command association with SAC. When I commanded SAC's Second Air Force, the Deputy Chief of Staff for Civil Engineering was Col Bob Thompson, later Brig Gen Bob Thompson and now Maj Gen Bob Thompson, Director of Engineering and Services for the Air Force.

We had the largest number of people of any numbered Air Force in the United States when we were together in 2AF, Bob. In fact, we were the third largest command in the Air Force, with 68,000 people and airplanes on

33 bases. We served a great command in a fast-changing environment . . . and we still do.

What is different about today's people and today's environment? I think people are a lot more important today—and recognized as such. Also, people are a lot more expensive! You have cited this as the first Air Force Engineering and Services Conference. I believe what you are really saying is that this is the first time the civil engineers have met in conference in their new incarnation as Engineering and Services —with that vitally important Service responsibility as a part of your charge. To me, this is a good thing—and about 26 or 27 years late!

I'm going to ask you to remember three observations that I will make tonight. The first is this: I was a major Air Force Commander before I ever really knew the civil engineer on an installation where I served! Let that "truth" sink in for just a minute.

In a lot of assignments, I knew the doctor, the operations officer, the Judge Advocate, and the commander; but I did not know the civil engineer. I never had occasion to seek him out and he never had occasion to seek me out. Isn't that a sad commentary for both of us?

I don't think that can happen again if you do your job—particularly with the services responsibility. You are going to have to know people on your installations. In fact, the people on every installation will become a very necessary aspect of your job. Don't let it be said on "your watch" that any officer had to become a major commander in order to have an occasion to know the engineer on the installation.

Let me see if I can reconstruct how all this happened (. . . and I'm going to be critical of myself and our Air Force). On the back of your program there are some reflections on Air Force milestones. Some of you weren't here in many of those days—some of us were. Let me show you something significant that I circled in my program. "On September 13, 1947, air bases and facilities valued at $4 billion were transferred to this fledgling service, the Air Force." "On October 10," —that's almost a month later— "The Directorate of Air Installations was established." We assumed $4 billion of facilities without a civil engineering establishment!

I wish you could have seen what the Directorate of Air Installations looked like in those days. It resembled greatly the Air Force Judge Advocate General's Department—'sorta one man, one sergeant and a flag. It looked in some ways exactly like the Air Force Medical Service . . . a group of winged flight surgeons with little idea of the extensive clinical requirements for caring for hundreds of thousands of men . . . just like the responsibility for administering $4 billion worth of facilities without an established, manned civil engineering structure.

In the press to establish the individuality that the Air Force deserved, some practical things came later. We forgot to provide many things in the beginning. Understandable, of course . . . but not good business. Our leaders "shook the bush" and said, "We need some lawyers." A few of us fell out, and they said, "You're judge advocates; you're the contracting officer, etc." They shook it some more and a few engineers fell out; a few fell out that weren't engineers, but the need was great, so they said: "You're engineers, too!" And a few others fell out to help the flight surgeon do all those interesting things like orthopedic surgery, gynecology and hospital administration that most of our flight surgeons hadn't been involved with.

We did a great job in preparing and flying the airplanes, but we almost forgot to prepare the supporting structure, to maintain the air bases and all those myriad things that went with caring for our people . . . and services . . . why "it just growed," like Topsy.

We did first things first, and I'm not critical of our superiors for the magnificent legacy they gave us. All I'm saying is that we started with a clean slate in 1947 and in the tumult that followed, we had to move so fast that we emulated some of the failures of the past and brought them over into the early beginnings of our service.

But how wonderful to have people-oriented engineers in a mission that is so intensely people-oriented—to have mission and people-oriented doctors, lawyers, administrators. Mission and people-oriented officers in our service will insure our future. We

Gen Russell E. Dougherty became CINC of SAC in August 1974, after serving as Chief of Staff, SHAPE. He commanded Second Air Force earlier. A bomber pilot and legal officer early in his career, he has filled various command and staff posts in SAC and has had four assignments in joint and international duties.

have a great opportunity before us today. I think it has taken us 27 years to begin to put things into perspective . . . and we're off and running.

One of General George Brown's most difficult, yet most thought-provoking questions came during his confirmation hearing to be Chief of Staff. General Brown had studied hundreds of anticipated questions; yet, the first question he got was: "Why does the United States need an Air Force?" He was so shocked that he still talks about it . . . but he recognized it as a valid, basic question that pertains to any big job.

So . . . today we might ask ourselves "why do we need an Engineering and Services—why are we organized this way—why did we merge Engineering and Services?" Obviously, the reason is managerial and logical—but, also, it will serve us well to get the engineers to come out of that professional "box" and to meet the people on their bases—to close the loop of building things and using what you've built. Not that you haven't done well; not that you haven't worked hard . . . but I think you've just begun to work.

In order not to be too redundant tonight, I asked what General Tallman talked to you about earlier in your meeting. Let me tell you what I was told he said—it adds up to: "Less money, less people, and more work."

If we're not careful, we'll all go away from the conference with a "Chicken Little" complex, crying that "The sky is falling." Some of us have thought that sky was falling several times before, and we've learned a lot from each scare. (One thing we learned was that the sky really didn't fall . . . another thing we learned was that all would be served better if we coupled Services with Engineering.)

Some of you may think that this change is a mixed blessing . . . Some (who are not here tonight) are a bit miffed at losing significant personnel and responsibility. If you are an Engineer who had his neat Engineering house in order, and look around and see colleagues in Services who have their Services houses in complete disarray, you might say, "What have I gotten into?"

But there is no such thing as just an Engineering house; no such thing as just a Services house; these are **our** houses—Air Force houses. I am reminded of something I used to hear again and again: "SAC needs." "SAC wants." "SAC requires." What a parochial attitude! SAC doesn't need anything that the United States doesn't need. We have no institutional rights. Likewise, Engineering (nor Services, for that matter) has no separate existence . . . we're all a part of our Service—in it, of it, for it.

Strategic Air Command is one of the specified commands . . . one of the combatant commands of the United States. It is also an Air Force organization. It was established in law as a combatant command because the people of the United States thought they needed a strategic command. If the United States feels it doesn't need a strategic command, then it can be rid of SAC very quickly. There are no birthrights, no guarantees, no givens, and we have to recognize that. We work for our country . . . in the way and with the organizations that best serve our country's needs. Too many tend to forget that.

Dr. Schlesinger, our former Secretary of Defense, pointed out several times that a democracy like ours gets the kind of military forces it deserves. One's response might be that ours is the greatest democracy, so we deserve the best military force, so we get the best. But Dr. Schlesinger didn't mean this statement for chest beating and tub thumping—he meant that the nature of things and the way we organize, run and equip our government's forces is, in the final analysis, subject to the will of our people through their legislative and policy spokesmen.

Why do we need an Air Force? I think the right answer is: "Because our nation has decided that we need one;" and, as long as that need exists—we'll have one.

Today we do need an Air Force—and we've got it, though with less people, less real money, and less priority than in prior days. Too often we talk about perceived losses as being deprived of our "fair share"—benefits from our "implied contracts," "Not in the best interests of the Air Force." Ridiculous!! There are no implied contracts with our government—we've either got statutory au-

thority or we don't. If it is regulatory, it is neither a matter of government interest or it's not . . . the "best interests" of our Air Force and our people are what the "best interests" of our Nation are—we have no life of our own. No Air Force interest conflicts with our Nation's interests.

You, now that you have the dual Civil Engineering and Services responsibilities in your commands, are going to find that the people that you cared for indirectly before, now are going to be coming in your door. You're going to look at them figuratively "eyeball to eyeball" as you assign their housing, as you listen to their problems and as you try to "bite the bullets" and make some of the Solomon-like decisions required. This is going to be a very meaningful peoples-association in our Engineering business and it will be thrilling and interesting for you.

It is also going to put you in much closer association with the Commander. You may recall from General Tallman's study that 47 percent of Air Base Group Commanders said the thing they felt most inadequate about was the Civil Engineering function. This is proof positive of what a big part your job plays in base management— and how important it is to do it right.

There is an old adage that "We had better hang together or we will hang separately." We've taken a big step toward hanging together by merging Services and Engineering. Now, the challenge to us is to merge Services and Engineering with all the rest of the things that go into making up the essentials of the Commander's job, at all levels. You are directly associated with the total command process and I encourage you to accept this association with vigor.

One of the reasons I left the Judge Advocate General's Office 25 years ago was over job separation. We were a young Air Force then, and there was a tendency—even an insistence—toward functional parochialism in many staff areas—a tendency I hope that we can stay away from today. But back then I was told that to remain a JAG I would have to divorce myself from the broader scope of overall Air Force activity and concentrate solely on purely legal activity and military justice.

I was perfectly willing to be responsible for the military justice program of my outfit, but I also wanted to be "house counsel" for the commander, and to be as closely identified with the total mission as I could be. I wanted to be a part of the total management process—to be the legal conscience and advisor to the Commander in more than just military justice. I didn't want to be in a "shoe box"—I wanted to get involved with the full gamut of things in which the Command Counsel could be helpful to the Commander—and that was nearly all of it.

In today's Air Force, only a rare vestige of this sort of functional parochialism remains. By and large, our Judge Advocates, and other highly specialized professional staff officers clearly recognize the need to consider the total service they can offer our service . . . and our commanders. They are part and parcel of the total Air Force management.

I think you ought to emphasize this approach to your officers. You ought to encourage them to become an integral part of the total command structure—not shut themselves up in a drafting office and "do their thing" but get involved with the spectrum of things in which their skills are needed and help the Commander "do his thing."

I encourage you and your field engineers to be a completely integrated, identified part of the command structure. After all, you will be dealing with one of the most difficult parts—the parts that most directly reflect doing things for people "where they live" . . . and that's important.

That brings me to the motto of your conference: "Service is our Business." I hope you don't treat it merely as a business, Bob. I hope you treat Service as a profession. I say that because when we think of "business" we normally think of the profit motive. And there's not a single profit motive associated with your jobs. Yours is people-intensive, and it's got to be professionally motivated—not business motivated—the profit motive is of no consequence and the altruistic motive is one of trying to do things better for your people, your Command and your Service. Taking a page out of SAC's book; just as "Peace . . . is Our Profession" how about "Service is Your Profession."

Of course, you'll work at it with the best business-like attitude, but with a more encompassing professional motivation. Some will say that this is a play on words, and I don't mean to

> ". . . it will serve us well to get the engineers to come out of that professional 'box' and to meet the people on their bases -- to close the loop of building things and using what you've built. Not that you haven't done well; not that you haven't worked hard . . . but I think you've just begun to work."

be critical, because I think that the motto you have chosen for the conference is just superb.

You, Bob, are off on a new charter from the Chief . . . the BMAG, the Base Management Action Group Study. This is a needed step in the direction of hanging together. We've got an awful lot of old "sacred cows" around.

A story came out in the **TIG Brief** about 15 years ago. I call it the "bench guard" story. It had to do with an American who visited a wealthy British nobleman in England some time after World War II. He was warmly greeted by his friend, the Earl, given a suite in his friend's castle, and entertained royally. During a large outdoor party on the beautiful grounds of the estate, he and his host roamed to the end of the expansive formal garden. Down at the far end of the formal garden was a magnificent archway of flowers, and under it a bench. Standing by this bench, appropriately attired in a magnificent Beefeater-type costume of bygone years was a fellow with a lance standing at stiff attention. The American asked: "Who is this?" The host responded: "Oh, that is the bench guard." "What is he doing there?" asked the American. The host replied: "Oh, he's always been there . . . he's the bench guard; and his father before him was the bench guard."

The American, his curiosity aroused, pursued the matter but to no avail—his host had accepted the presence of the bench guard without question—as had his father. Finally, in the servant's quarters an elderly man was found who remembered the story from his past: that the Earl's grandfather was giving a garden party but the bench, freshly painted, was not properly dry. To preclude soiling a party dress, a guard was dispatched to "guard the bench" and prevent soiling by the tacky paint.

I wonder how many "bench guards" we have around the Air Force today? Perhaps through this Base Level Management Group we can scan our entire activity critically — and every time we get a "people-intensive" blip on our scope we can look further to find out if it need be people-intensive . . . for our people are not only important, they're very expensive!

We also suffer from our regulation; sometimes without apparent reason. Whenever you find the only apparent justification for an activity to be "AFR so and so," or "DoD directive so and so," let's look closely at it . . . we may find a few "bench guards" masquerading as regulations.

We have to look critically at every hot spot where we use people. If we don't, we could become so people-constrained that the things that we need to do to keep modern and relevant may be going by. That 47 percent of our budget for people, the Army's 60 percent could easily become 70 or 80 percent. It could become so exponential that it takes on a life of its own. We can price ourselves out of the people's market just as we have in some weapons systems' markets. We must be intense in our self-examination.

I do encourage you to look at your overall Service function as a profession—as your profession —with all the headaches that go with it. Folded into your Engineering environment . . . this new role makes the engineers of our Air Force akin to the hospital staff, the people on base who most closely and intimately affect the morale and welfare of our people.

Don't let it be said of you that the only man who knows his civil engineer is the Numbered Air Force Commander. Get to know those people.

Now . . . with the rising costs of our people, with all the potential costs of our B-1, research and development, AWACS, MINUTEMAN, F-15, F-16, etc., etc., and all the other improvements needed, there is one thing that you and I can do that doesn't cost a nickel. It is a most dramatic improvement which we can make at no cost at all—and you don't even need higher headquarters approval to do it! We can all give an extra measure of effort in caring for our people!

For absolutely nothing we can have a major escalation in our

ability to help our people, I ask that you try yourself, and this will set an example for all of those who work with you; particularly the CESMET teams. (By the way that name CESMET sounds rather poetic—should be an opera, or something!) Let's all see if we can't get more and more into the "caring for people" realm.

Then the second thing I would like for you to remember from what I am saying tonight is that you're appreciated to a greater extent than ever before. I think that commands are more and more aware of what engineering means to them. We're closer to it than ever before. I think that the folding in of services will be a tremendous personal rejuvenation for engineers. Many of our engineers had almost begun to do your own thing in your own environment.

You now have new dimensions to the environment—headaches, heartaches, indigestion—and challenges. That is because you are getting into the "people" area. When people are involved, things are just tougher than they are where they can be reduced to balance sheets and slide rule calculations. People are a sort of never-ending process of design, build, lose and rebuild. The "people area" is one where there are no absolutes, except your own motivation with regard to your fellow man. It's good to know that you've got the kind of chief that you've got to spearhead this new direction, one who is as sensitive to people as anyone I know.

It is good to know that we have had a continuing succession of wonderful engineers in the Air Force who have done well and have been prudent and competent in their expenditures. In fact, they have even made good in the Bible, where Luke says: "Which of you intending to build a tower, sitteth not down first and counteth the cost, and whether we have sufficient to finish it."

But if you read that whole Fourteenth Chapter of Luke, you'll find it was just folding engineering into the whole panoply of human relations . . . as I've tried to do tonight. If we aren't sensitive to doing things for people, we can get the kind of complex that implies: "I've got a neat, full supply bin over here and I've got to keep it neat and full . . . so I cannot afford to issue any of it."

Let's leave our watch better for our having served. I suppose I'm well known in SAC for my interest in base beautification . . . at low cost. I've a thing about trees—good trees, cheap trees . . . and they are available. We can find trees for the asking. We're a government instrumentality. When we are trying to improve our base it's not for personal gain, or for profit—but for posterity.

"Engineering (nor Services, for that matter) has no separate existence . . . we're all a part of our Service -- in it, of it, for it."

We can find other government instrumentalities— or private citizens—who will give us trees. Just look at this beautiful base here at Homestead. Look at this beautiful variety of trees. Our predecessors planted them . . . let's be as thoughtful for those who will follow us.

Those of you who have been to March AFB will remember those beautiful trees around the old permanent building area. You should know how they got there. Major Hap Arnold's wife was interested in base beautification and energetic enough to go downtown and trade empty #10 cans from the mess hall to a nursery that gave her seedling trees; which she planted with tender loving care. That's one key reason why old March AFB is so pretty today. I'm sure she had a lot of help from the base engineer . . . but that's an indication of how our predecessors have helped us. I hope we can do as well for those that follow us.

What wonderful places we can have if we spend wisely—let's not build shoddy things. We have too much cheap stuff around already. We're building for people. Yes, we have to close some facilities, we build some things too late, some things we find we don't need, and have to give them up. But that's going to happen in a democracy—Remember, our democracy gets the kind of military forces it deserves—and our perceptions of need go up and down with changing pressures and priorities. That's no reason not to build well what we do construct.

We're going to have some lead and lag time like that in our business because it is imprecise. It's dynamic, and it's relevant and has to be. It's not merely how we like it . . . it's what our Nation wants. People talk about the "arms race;" you and I aren't running very well.

In many respects we're coasting today—but we've got to stay relevant. We are doing our best to make wise choices and sound recommendations, but we're going to have some losses and some disappointments. Let's not let those losses occur at the expense of our people. To an ever greater degree, let's you and I accept the responsibility of being their advocate . . . whenever they're right. I don't advocate defending what's wrong—but I think we must stand tall for what is right and fair.

Now . . . the third thing I'd like you to remember from my talk tonight. When you are frustrated with all the problems of bureaucracy and all the problems of society and how this translates over into those people for whom you are responsible, don't let it get you down. Don't go to your boss and say, "Well, we are just a segment of our society; I've got

an outfit that is a cross section of society—no better, no worse. You can't expect any more of me than you can of society." If you take that defeatist attitude, he has a logical reason to kick you out of his office.

Let's look at some of the differences between service in the US Air Force compared to the rest of society: First, everybody in the Air Force has a job—there's no unemployment in our Service. Next, we have the adequate, competent medical care for our people—not many can say the same.

Third, our people may gripe about the food, but we've got fine dining facilities, wholesome food—and plentiful in quantity. No one in our Air Force need go hungry.

Fourth, our people are adequately clothed—our clothing is warm, comfortable and available. Nobody in the Air Force need worry about clothes to wear.

Fifth, our people are well paid. An individual may not be satisfied; but, by and large, we receive a liveable wage and no one in our Service need be poor.

Finally, the most important distinction—an attribute of service in the Air Force that is completely unique in society . . . we've got an organization that is built around the institutional responsibility for caring for our people. There is no one in the Air Force who is not cared for . . . what a difference that is from the millions throughout the world for whom nobody cares.

"Taking a page out of SAC's book; just as 'Peace is Our Profession,' how about 'Service is Your Profession.' "

So, let's get rid of that "Chicken Little" complex and encourage our people to quit feeling sorry for themselves. The sky is not falling. We've got a young dynamic service with highly educated, disciplined people. The average age in SAC is just a little over 25 and they are a fine, responsible force. You can't convince me that our young men and young women aren't disciplined. I guarantee you they are. They "do their country's thing," and not "their own thing." And I think the fine people in SAC are to be found throughout the Air Force. We can be more selective, and we are being more selective . . . and this is a good thing.

I would encourage you to be encouraged. The future of our Air Force is bright and the future for the Engineering and Services area is particularly bright. You've got the support of the Chief, of your Commanders, and the respect of your people. I think you can look forward to continued support and recognition for your good works and to the respect and appreciation of the people you serve . . . that you and your people are going to get.

You certainly have mine.

Thank you, Bob, for letting me be a part of this conference.

E&S

Civil Engineering Officers Selected to Attend Senior Service Schools

HQ USAF recently named seven colonel selectees and five lieutenant colonels to attend senior service schools.

Colonel selectees scheduled to attend Air War College are: George A. Bohlen; Herbert D. Paul; John D. Pearman; George L. Rutland, Jr; William M. Shaw; Jr; and George J. Thomas, Jr. Hisao Yamada will attend the Industrial College of the Armed Forces.

Lieutenant colonels who will attend Air War College are: John A. Hampton; Richard C. Noakes; Dibrell C. Stowell; and as an alternate, David P. Gibbs. Lt Col Willett R. Stallworth was chosen to attend the Industrial College of the Armed Forces.

Directorate of Engineering and Services

Current Emphasis

brief commentary on significant developments

CENTRAL SUPERVISORY CONTROL SYSTEMS (CSCSs)--are rapidly becoming part of the Base Civil Engineer's inventory of energy and dollar savings systems. There are 29 existing systems in nine commands either installed or under construction. If your base has one, know its capability and use it. If you do not have one now, learn all you can about the system for you will have one soon.

EARLY ADVERTISEMENT OF CONSTRUCTION PROJECTS URGED--For better competition and lower costs, now is the time to issue invitations for bids on construction projects. During the first two months of 1976, 22 projects in the MCP were awarded with an average of 10 bidders per project. Construction costs are well below programmed amounts.

COURSE 2ASR57159-12, FIRE PROTECTION ORIENTATION--begins in May 1976. This course is available to civil engineer officers and officers preparing for this position. The course is five days in length and will be conducted at the USAF Fire Protection School, Chanute AFB, IL. Quotas are controlled by ATC/TTMS, Randolph AFB, TX 78148.

BACKLOG OF MILITARY CONSTRUCTION--Increased attention is being given to the backlog of essential military construction by the Congress and OSD. Procedures for generating and reporting backlogs are under review. Future changes will make the HAF-PRE(AR)-7116 Report a more credible and reliable base for programming essential military construction. Make sure your backlog is valid, reliable and can withstand the test of essentiality.

CONTRACTOR OPERATED CIVIL ENGINEERING SUPPLY STORE (COCESS)--popularity is increasing despite a local purchase only restriction for new stores which are opening at bases in several MAJCOMs. A nearly completed DOD study on civil engineering supply support should provide a clearer picture of what is in the future for COCESS.

BEAMS--Recent changes eliminate Total Programming documentation and implement automated COCESS features in AFM 85-200. The optional COCESS program provides fund status, consumption data, contractor responsiveness and an on-line Material Requirements List. Automatic shop rate computation and update capability is scheduled for June 1976 release.

NONDESTRUCTIVE AIRFIELD PAVEMENT EVALUATION--AFCEC is starting the phase-in of a newly developed method for evaluating airfield pavements nondestructively. This spring the nondestructive method will be used concurrently with the destructive method at selected bases for one year.

EXPANDED CLEAR ZONE PROGRAM--Every base engineer should know if he has an expanded clear zone project and become familiar with it (including Corps of Engineers' actions to purchase the land). Be sure your base commander, wing commander or equivalent base official know about it.

COURSE 3AZR55000, CIVIL ENGINEER INSPECTOR--is being conducted at the Technical Training Center, Sheppard AFB, TX. (continued next page)

A revised course description and new course prerequisites are contained in Change 1 to AFM 50-5. Forthcoming Change 2 will revise the course title to Contract Construction Inspector.

TOTAL PROGRAMMING--In December 1975, Air Force eliminated the Total Programming System from base level procedures, because of high operational cost with little identifiable payback. Simplified procedures for identifying and processing work have been provided to MAJCOMs; and will be further documented in a forthcoming change to AFR 85-1.

MCP MANAGEMENT--In a recent ALMAJCOM letter, PRE emphasizes the need for improved MCP management. On projects handled by the Corps and NAVFAC, we must make thorough functional reviews. User changes must be held to a minimum consistent with mission essentiality. Additionally, pecuniary liability should be assessed against the contractor (designer or builder) in those justified cases authorized by ASPRs and terms of the contract.

RCS: HAF-PRE(AR)7124--The design and construction management report is designed to provide PRE the current status of all active projects. This management tool is used daily in responding to numerous inquiries. Insure that the data provided are current and accurate.

COMMISSARY CONSTRUCTION FROM SURCHARGE--Operating under the new concept of funding commissary construction from surcharge funds, two projects have been approved and are under design. These provide for a new facility at Davis-Monthan AFB, AZ at a cost of $2,800,000 and a major rehabilitation of L. G. Hanscom AFB, MA commissary at a cost of $1,861,000.

UTILIZATION OF FAMILY HOUSING--Downtime at change of occupancy of family quarters increased during the 1 Jul - 31 Dec 75 reporting period. During the previous six months, downtime averaged 7.5 days per move out; the figure has climbed to 9.4 days. The average for adequate housing was 9.6 days, while inadequates averaged 7.5 days of vacancy per move out. Increased emphasis is needed to reverse the trend.

SMOKE DETECTORS IN FAMILY HOUSING UNITS--Prior PREN guidance advised all future new housing and improvements projects will include smoke detectors as mandatory. PREN letter, 19 Feb 76, Smoke Detectors in Family Housing, requires that smoke detectors be GFE and be supplied from GSA sources, unless Bush contracts, COCESS or GOCESS can provide comparably priced equivalent items.

FAMILY HOUSING ENERGY CONSERVATION PROJECTS--Commands have been asked to use most realistic fuel costs including future escalation in computing amortization. AF/PREEU 261751 Nov 75 provides guidance. Insure that all energy savings have been considered. Commands have been asked to solicit more individual energy projects for the FY 77 through FY 81 family housing programs.

AAFES OPERATION OF CLOTHING SALES STORES--AAFES reached agreement on a DOD approved proposal for AAFES to operate all Air Force military clothing sales stores worldwide using non-appropriated fund employees. The implementation schedule calls for all clothing stores to be transferred to AAFES by the end of June 1976.

LEAVE BALANCING AT END OF FISCAL YEAR--Conversion to the 1 Oct - 30 Sep fiscal year changes the date of military leave balancing. Balancing by dropping leave in excess of 60 days will be on 30 Jun 76, 30 Sep 77 and each 30 Sep thereafter.

SHOP RATE MODIFICATION--A new shop rate concept will be implemented 1 Jul 76. The new concept provides automatic computation of all phases of the shop rate and reduces the number of shop rates about two-thirds. These changes should improve shop rate accuracy.

In order to offset part of the losses due to decreasing resources the Air Force has had to initiate various programs so that various missions can continue. USAFE has been a leader in providing needed services in the form of base maintenance contracts.

BASE MAINTENANCE CONTRACTS: A different approach

by Capt George E. Ehnert, PE

The Air Force, as with the other armed services, has been confronted with steadily decreasing resources of men, material and funds. To offset part of these losses, each service has had to initiate various programs in order that their various missions can continue. Within the Air Force, USAFE has been a leader in providing needed services in the form of base maintenance contracts. These contracts are operating in four foreign countries, have a combined annual cost of approximately $25 million, and are found in almost 100 locations throughout Europe and the Middle East. Civil engineering services are among the most often provided and comprise a larger share of the contracts than the other contracted functions.

What is a Base Maintenance Contract?

A base maintenance contract (BMC) is a non-personal services contract awarded to a civilian company that provides specific services as listed in specifications. These specifications are prepared by the functional areas covered in the contract and they set forth those requirements needed to perform to desired standards. Services performed in USAFE include civil engineering, transportation, supply, food service, linen exchange, security, office machine repair, housing services, and commissary, as well as other smaller base support functions. The contractor may be either an American or foreign company usually employing a core of American personnel. The bulk of the work force, however, is local nationals.

Why do we have BMCs?

The decision to select a BMC, after a detailed selection and determination process, is essentially based on two overriding considerations: can the job be civilianized (or is it military essential?) and is it cheaper than civil service? The decision to civilianize a function is made after a thorough evaluation of factors involving manpower ceilings, combat roles and other hazardous operations.

The cost of a BMC has a major impact upon the decision. In certain areas, a BMC costs less than an in-service operation performing the same tasks. These savings are realized in several areas: First is direct wages. Labor salaries in many overseas countries are considerably lower than either American military or civilian salaries. Contractors may also be able to hire local nationals at a lower salary scale than the US government due to country to country agreements. The second area is support costs. Most contract employees in Europe are local national employees. Overhead costs requiring government support for commissary, base exchange, hospital, etc., are minimal. Transportation of household goods and families is reduced. Therefore, the base support requirement is reduced in proportion to the reduction of DOD personnel. Further, reduction in the number of in-service personnel reduces the government's liability for retirement pay and benefits.

Another reason for using BMCs is that it reduces the American military profile in foreign countries. In some cases, foreign governments strive to reduce the size of US military presence in their countries for political reasons. A BMC can ease these political situations by employing a large force of local national civilians to perform those functions usually accomplished by military personnel. BMCs also provide more continuity than is possible with a military operation.

What are some disadvantages to BMCs?

Naturally, disadvantages exist in a BMC. The most significant

involve response to an emergency that requires direct combat support and disaster response. The number of military personnel at a BMC base is reduced due to the 100 percent civilian contractor work force. These civilian workers are not always available to perform hazardous duty, especially direct combat support. Local national personnel in overseas areas are also susceptible to local political disturbances as well as strikes and related international tension. Under these circumstances, the contractor may not be able to provide sufficient workers to cover these essential functions. It then becomes necessary to augment the base force with military personnel in a temporary duty status. Personnel must then come from military resources within the command, or, if the command cannot provide them, Headquarters US Air Force must be tasked to provide assistance from US bases. In civil engineering, we are prepared to meet these crises with specialized composite Prime BEEF deployments. However, there are many functional areas that are not prepared to respond as rapidly as Prime BEEF. Installation commanders find that another disadvantage is less flexibility and control over the contracted functions. Contractor response to changing conditions or missions requires modification to contracts before implementation. Thirdly, many additional duties performed by military personnel as standard practice are no longer accomplished because emergencies and unforeseen requirements cannot be written into a contract.

How extensive is the BMC Program?

BMC services are performed in varying degrees at approximately 100 locations throughout Europe and the Middle East. All of these locations fall under one of the four current contracts which employ about 4,500 personnel, mostly local nationals.

How does the Air Force insure that the contractors perform according to specifications?

For each contract, there is a procuring contract officer (PCO) appointed. This PCO has overall authority and responsibility for administering the contract under his control. To assist him, one or more administrative contracting officers (ACO) may be appointed. An ACO is a PCO who is usually located in a separate geographical area and whose job is to handle the administrative details at detached sites. Communications are speeded and better control can be given at the outlying locations. Each PCO and ACO is assisted by a Technical Representative of the Contracting Officer (TRCO), who has technical experience to determine if provisions of the contract are being fulfilled. The TRCO is an officer, NCO or civilian who is fully qualified in his AFSC and who performs evaluations of the contractor's performance. For example, the TRCO for civil engineering evaluates the contractor in such areas as civil engineering, fire protection and family housing.

What does a TRCO do in general?

Each TRCO evaluates the contractor's performance of his assigned functional area to insure adequate surveillance of the performance. This evaluation may be daily, weekly or quarterly, depending upon the scope of the contract. The TRCO obtains his authority and basic guidance from **AFR 70-9**. He must know the contract under which he is working. The contract provisions, or Appendix, are the TRCO's Bible. Regardless of how well he may know the many regulations and manuals pertaining to his field, the TRCO must remember that the contractor is responsible only for those requirements which are contained in the contract. If a publication is not included in the specifications, the contractor is not required to comply with it. If a certain responsibility is **specifically** described in the contract, the contractor is responsible for compliance with that requirement. If new regulations or directives are published, the contractor is not required to comply with them unless a contract modification is accomplished. Such changes often cost the government money to implement.

The second step is to establish an evaluation plan or schedule. Most TRCOs have a variety of functions under their areas of responsibility. To insure that all areas are covered on a recurring basis, the TRCO establishes a schedule listing the specific areas needing evaluation. The schedule contains administrative items such as reviewing contract directives and posting of modifications; military duties, such as commander's call and TDY; and TRCO duties, such as monthly TRCO meetings and special meetings with the contractor. Most important, however, the schedule reminds the TRCO of the areas in his functional areas that need attention, those that have been evaluated less than satisfactory in the past, those for which the contractor has submitted management or "get well" plans, and those areas identified by inspections or staff visits as requiring corrective action. These schedules are followed as much as possible but must be flexible. With the schedule developed, the TRCO is ready to begin evaluating the contractor.

The primary tool the TRCO uses for evaluations is the AF Form 184, TRCO Log. This form serves as a record to list the actions of the TRCO and to document contractor performance or lack thereof. The TRCO then presents the log to the contract supervisor and obtains his signature and a written statement proposing corrective action. A period of evaluation is usually a month but may be once a quarter in the case of a remote site. At the end of this period, all logs are compiled,

reviewed and used to prepare an evaluation report for the period.

The report is given an overall rating of satisfactory, marginal or unsatisfactory. If all areas of the contract have been performed as required in the contract, an evaluation of satisfactory is appropriate. If areas of the contract have not been performed according to specifications, if performance in any or all of the requirements of the contract are below acceptable standards, or if standards have not been met, then an evaluation of unsatisfactory may be appropriate.

An evaluation of marginal indicates transitional performance. It could indicate that a contractor's performance which has been previously satisfactory is beginning to deteriorate, and, if not improved, could lead to unsatisfactory performance.It could also indicate that a contractor's performance, previously evaluated as unsatisfactory, is beginning to improve. This could be a result of a sudden increase in performance by the contractor or as a result of having submitted a management plan and successfully meeting established milestones. A fully substantiated evaluation of unsatisfactory can result in partial payment being withheld from a contractor. The size of the withholding depends on the magnitude of the unsatisfactory performance.

What does a CE TRCO do in particular?

The civil engineering officer or non-commissioned officer (NCO) is responsible for evaluating all phases of civil engineering required under the contract. At some locations, where all of civil engineering is under contract, he will be responsible for civil engineering, housing and fire protection. At others, only part of normal civil engineering services have been contracted. In addition to being the TRCO for civil engineering at these locations, he may also be the fire marshal and be in direct command of a "blue suit" fire department. A listing of just a few of his duties include insuring compliance to the in-service work plan; validating and approving construction programs, plans and specifications; assuring proper vehicle utilization; insuring that safety standards are met; creating interservice support agreements; evaluating utility contracts; evaluating work force management; insuring reimburseable charges are processed and all of the many responsibilities usually required of the Base Civil Engineer. He must also prepare requests for modifications to the BMC including cost estimates, prepare new contract specifications, serve as an advisor to the commander, and perform all required duties not contained in the contract.

Does a TRCO accomplish his duties alone?

This depends on the size of the area under contract. At some locations, where the scope of work is small, a TRCO may be able to accomplish his duties by himself. One TRCO may be able to evaluate several small isolated sites by himself. At larger installations, the TRCO usually has several assistants called monitors. Monitors are specialists and are assigned to evaluate certain areas of the contract, that is, structure, mechanical, work control, fire protection or housing. Each should be highly experienced in his area and have the technical experience needed to be able to evaluate contractor performance in a wide variety of activities.

What kind of qualifications should a TRCO or Monitor have?

First of all, the TRCO must be fully qualified in his field. He must know the publications that govern civil engineering and the interrelationship of all civil engineering activities. He must have experience in dealing not only with civil engineering functions, but with all base functions. He must be able to recognize sound craftsmanship, technical designs, emergency response and analyze complex plans.

CAPTAIN EHNERT *is a student in the Facilities Management course, School of Systems and Logistics, Air Force Institute of Technology, Wright-Patterson AFB, Ohio. Previously, he was a Technical Representative of the Contracting Officer for Civil Engineering, Zaragoza AB, Spain. He earned his degree in civil engineering from Bradley University and is a registered Professional Engineer in Pennsylvania.*

Is there any special training available?

USAFE has established several training and information programs. Soon after being assigned to a BMC base, the TRCO or monitor is sent to a TRCO training seminar. These three day seminars are held throughout the command and are under the overall direction of the Director of Procurement. The course is a compilation of inputs from all functional areas including civil engineering where personnel are formally introduced to the world of base maintenance contracts.

The Challenge

The civil engineer performing TRCO duties faces a unique challenge. To satisfactorily accomplish these duties, he must draw on all of his acquired skills and knowledge, plus develop new techniques that are completely different from any of his previous endeavors. The future promises to offer increased exposure for base maintenance contracts and for all the civil engineers involved. The civil engineer who maintains a can do—will do spirit, can meet this challenge. E&S

FY 77 SHORT CO

WRIGHT-PATTERSON

Civil Engineering School

ENGINEERING TECHNOLOGY COURSES

ENG 461 HVAC I (4 wks): for design engineers.
ENG 560 HVAC II (3 wks): for experienced mechanical engineers.
ENG 480 Building Systems Maintenance Engineering (3 wks): for engineers/architects in E&C branch.
ENG 590 Corrosion Control (2 wks): for corrosion engineers.
ENG 471 Electrical Engineering (4 wks): for design engineers.
ENG 470 Electrical Engineering for Supervisors (2 wks): for engineers in E&C and O&M branches.
ENG 460 Mechanical Engineering for Supervisors (3 wks): for engineers in E&C and O&M branches.
ENG 500 Environmental/Sanitary Engineering (1 wk): for civil and sanitary engineers.
ENG 550 Pavement Engineering (3 wks): for pavement engineers.
ENG 540 Structural Problems (2 wks): for civil engineers.

MANAGEMENT APPLICATIONS COURSES

MGT 001 Base Civil Engineering (2 wks): for the newly assigned officers and civilian equivalent.
MGT 420 Engineering & Construction (2 wks): for chiefs of E&C branches.
MGT 406 Family Housing (2 wks): for chiefs of Family Housing branches.
MGT 403 Industrial Engineering (2 wks): for chiefs of Industrial Engineering branches.
MGT 430 Operations & Maintenance (2 wks): for chiefs and deputies of O&M branches.
MGT 410 Programs (2 wks): for chiefs of Programs branches.
MGT 400 Base Civil Engineering Staff Officer (2 wks): for BCEs and Deputy BCEs.
MGT 002 Commanders' Civil Engineering Orientation (1 wk): for wing and base commanders and deputies.
MGT 004 Environmental Protection Committee Members (1 wk): for base environmental protection committee members in eight functional areas.
MGT 510 Land Use Planning (1½ wks): for base development planners.
MGT 415 Contract Preparation (2 wks): for architects and design engineers in E&C.
MGT 425 Contract Management (2 wks): for architects, construction management and design engineers in E&C.

SHEPPARD

School of Applied Aerospace Sciences

This Training Group is engaged in training personnel in basic, lateral, supplemental, advanced and special courses in support of four Air Force career fields: Airman Metal Working (53); Airman Civil Engineering Mechanical/Electrical (54); Airman Civil Engineering Structural/Pavements (55); and Airman Civil Engineering Sanitation (56).

AFS 535X0, Corrosion Control Specialist/Supervisor
3ABR53134—Corrosion Control Specialist—PDS Code AGZ (7 wks)
3AZR53154—Aircraft Corrosion Control—PDS Code E9N (1 wk 3 days)
4AST53154—Corrosion Control Specialist—PDS Code E9N (1 wk)

AFS 541X0, Missile Facilities Specialist/Technician
3ABR54130F—Missile Facilities Specialist, LGM-25—PDS Code EMJ (First 7 wks fundamentals conducted by Dept of Comm-Missile Tng) (21 wks)
3AZR54150F-1—LGM-25 Water and Waste Subsystems Maintenance—PDS Code QTR (4 wks)

AFS 542X0, Electrician/Electrical Technician
3ABR54230-1—Electrician—PDS Code AJZ (9 wks)
2ASR54250-2—JSIIDS Installation and Maintenance—PDS Code T7N (3 wks)
2ASR54250-12—Intrusion Alarm Sys—PDS Code B8N (2 wks)
2ASR54250-17—Cathodic Protection Maintenance—PDS Code BKE (2 wks)
4AST54250-4—Fire Alarm Systems—PDS Code QJM (2 wks)

AFS 542X1, Electric Power Line Specialist/Technician
3ABR54231—Electric Power Line Specialist—PDS Code GBS (13 wks)
2ASR54251-9—Airfield Approach Lighting, Condensor Discharge—PDS Code C89 (2 wks)
2ASR54251-10—Electric Distribution Sys Maintenance—PDS Code EJ8 (6 wks)

AFS 543X0, Elec Power Production Spec/Tech
3ABR54330—Elec Power Production Spec—PDS Code AJV (17 wks)
3AAR54370—Elec Power Production Tech—PDS Code BVO (9 wks)
2ASR54350-1—Arresting Barriers—PDS Code LND (2 wks)
2ASR54350-11—Electrical Protective Devices—PDS Code PCT (2 wks)
2ASR54350-35—MB-Teen/EMU Generators—PDS Code DYB (3 wks)
4AQT54350—Electronic Principles—PDS Code TCV (5 wks)
4AST54350-1—Acft Arresting Barriers, BAK-9/MA-1A—PDS Code G5G (1 wk)

URSE OFFERINGS

LOWRY

School of Applied Aerospace Sciences

30BR6221 Supply Services Operations Officer (5 wks): Lieutenant through lieutenant colonel, assigned to or being assigned to Services Staff Officer or Services Operations Officer positions. Civilians, GS-7 and above, assigned as Chief of Services, Services Operations Officer, or officer level position on Services staff.

3AAR61170-1 Supply Services Supervisor (5 wks): AFSC 61150 or higher. Equivalent qualifications for civilians.

3AAR62270 Food Service Supervisor (5 wks, 4 days): AFSC 62250 or 62270. Civilians with comparable qualifications assigned to Food Service Supervisor duties.

3ABR62230 Cook (8 wks):
Prerequisites: none.

SHEPPARD—cont'd

4AST54350-2—Acft Arresting Barriers, BAK-12/MA-1A—PDS Code G58 (1 wk 2 days)
4AST54350-4—Acft Arresting Barriers, BAK-9/BAK-12—PDS Code G6A (1 wk 3 days)
4AST54350-5—Acft Arresting Barrier, BAK-12—PDS Code DXO (1 wk 1 day)
4AST54350-9—Acft Arresting Barriers, MA-1A/BAK-9/BAK-12—PDS Code GZO (1 wk 4 days)
4AST54350-23—AUTODIN Uninterruptible Power System—PDS Code RBF (9 wks)

AFS545X0, Refrigeration and Air Conditioning Spec/Tech

3ABR54530—Refrigeration and Air Cond Spec—PDS Code ATA (17 wks)
3AZR54550—Refrigeration and Air Cond Controls (M-H)—PDS Code CVQ (3 wks)
3AZR54550-1—Refrigeration and Air Cond Controls (Johnson)—PDS Code CVL (2 wks)
3AZR54550-2—Refrigeration and Air Cond Equip—PDS Code CVN (5 wks)
4AST54550-7—Titan II Missile Weapon Environmental Control System, LGM-25C—PDS Code R6C (1 wk)
4AST54550-8—Air Conditioner, A/E32C-24/26—PDS Code SZR (1 wk)
4AST54550-9—Utility Control System—PDS Code TEK (1 wk)

AFS 547X0, Heating Systems Specialist/Technician

3ABR54730—Heating Systems Specialist—PDS Code ALO (10 wks)
3AZR54750A—Central Heating Plant Spec—PDS Code NRS (5 wks)

(cont'd on next page)

CHANUTE

School of Applied Aerospace Sciences

Fire Protection Specialist (Basic Course)
(3ABR57130-1) (9 wks): Category A required training for all new military airmen being assigned to the fire protection career field AFSC 571X0. Also available to new Army firefighters, new civilian hirees and foreign students. Quota controlled by ATC/TTPP.

Fire Protection Specialist (Munitions)
(3AZR57150-1) (2 wks): AFSC 57150/70 or civilian equivalent in fire protection. SECRET security clearance required and must be stated on the TDY orders.

A/S32P-2 Firefighting Vehicle Operator
(3AZR57150-2) (2 wks): AFSC 57150/70 or civilian equivalent with a minimum of two years continuous service in fire protection. Valid operator's permit authorizing operation of crash firefighting vehicles required.

Firefighter Rescueman
(3AZR57150-3) (4 wks): AFSC 57150/70 or civilian equivalent with a minimum of two years continuous service in fire protection. Must have valid operator's permit to operate rescue vehicles. Must have face shaven in such manner not to interfere with the wearing of breathing apparatus.

A/S32P-4 Fire Truck Operation
(3AZR57150-4) (2 wks): AFSC 57150/70 or civilian equivalent with a minimum of two years continuous service in fire protection. Valid operator's permit authorizing operation of crash firefighting vehicles is required.

Installed Fire Protection Systems
(3AZR57150-9) (2 wks): AFSC 57150/70 or civilian equivalent with experience in fire protection, or MAJCOM position in fire protection or fire prevention functional area.

Fire Prevention Technician
(3AZR57170) (4 wks): AFSC 57190/70/50* or civilian equivalent, SSgt/GS-6 or higher, with minimum of three years experience in fire protection or officer or civilian possessing an AFSC in 55 career field area who occupy an intermediate or MAJCOM position in the fire protection or fire prevention functional area. *AFSC 57150 must be assigned direct duty to technical services functional area.

(cont'd on next page)

FY 77 SHORT COURSE OFFERINGS

SHEPPARD—cont'd

Contract Construction Inspector
3AZR55000—Contract Construction Inspector—PDS Code BK5 (6 wks)
AFS 551X0, Pavements Maintenance Spec/Tech
3ABR55130—Pavements Maintenance Specialist—PDS Code AQZ (7 wks)
3AZR55150—Pavements Maintenance Specialist—PDS Code GAL (3 wks)
AFS 551X1, Construction Equipment Operator/Tech
5ABA55131—Construction Equipment Operator—PDS Code AGV (Conducted at Ft. Leonard Wood, Missouri) (10 wks)
AFS 552X0, Carpentry Specialist
3ABR55230—Carpentry Specialist—PDS Code NDZ (8 wks)
AFS 552X3, Masonry Specialist
3ABR55233—Masonry Specialist—PDS Code NDO (8 wks)
AFS 552X4, Protective Coating Specialist/Technician
3ABR55234—Protective Coating Specialist—PDS Code ASP (7 wks)
AFS 552X5, Plumbing Specialist/Technician
3ABR55235—Plumbing Specialist—PDS Code ARL (9 wks)
AFS553X0, Site Development Specialist/Technician
3ABR55330—Site Development Specialist—PDS Code ATO (17 wks)
2ASR55350-2—Site Development and Surveying—PDS Code DXN (7 wks)
AFS 554X0, Real Estate-Cost-Management Analysis Spec/Tech
3ABR55430—Real Estate-Cost Management Analysis Specialist—PDS Code HNN (6 wks)
3AZR55450—Industrial Engineering Techniques—PDS Code TFM (5 wks)
2ASR55470-5—Real Estate and Cost Management—BEAMS—PDS Code FQA (2 wks)
AFS 555X0, Programs and Work Control Specialist/Technician
3ALR55530-3—Programs and Work Control Spec—PDS Code G6J (8 wks)
2ASR55570—Programs and Work Control Tech—BEAMS—PDS Code FP9 (2 wks)
4AST55570-1—BCE Planning Technician—PDS Code N5H (1 wk)
4AST55570-4—Resource Management (AFR 85-1)—PDS Code QFY (1 wk)
AFS 566X0, Entomology Specialist/Technician
3ABR56630—Entomology Specialist—PDS Code AJ4 (6 wks)
3AZR56650—Disease Vector and Pest Control Technology—PDS Code N18 (4 wks 2 days)
2ASR56650-2—Pest Control (SEA)—PDS Code D5V (2 wks)
2ASR56650-3—Application of Herbicides—PDS Code HE9 (3 wks)
4AST56650-1—Pest Control—PDS Code KK9 (2 wks)
AFS 566X1, Environmental Support Specialist/Tech
3ABR56631—Environmental Support Spec—PDS Code AWT (12 wks)
2ASR56651-5—Demineralized Water Plants—PDS Code BRJ (2 wks)
2ASR56651-7—Sewage Plant Operation—PDS Code CXJ (2 wks)
2ASR56651-8—Industrial Water Treatment—PDS Code D8N (4 wks)
2ASR56651-10—Field Water Purification Plant Oper (600 GPH)—PDS Code EUF (1 wk)

CHANUTE—cont'd

Fire Protection Supervisor
(3AAR57170-1) (4 wks): AFSC 57150, SSgt or civilian equivalent or higher with a minimum of three years continuous service in a firefighting organization and at least six months supervisory experience in one or more functions of a firefighting activity. SECRET security clearance required and must be stated on the TDY orders.

Fire Investigation
(3AZR57170-8) (2 wks): AFSC 57170/90 or civilian equivalent with minimum of three years experience in fire protection, or MAJCOM position in the fire protection or fire prevention functional areas.

Crash Firefighter
(2ASR57150) (3 wks): AFSC 571X0 military and civilians requiring basic training in crash firefighting.

Fire Suppression Operations
(2ASR57150-10 (2 wks): Designed for Army National Guard and Reserve units requiring structural and crash firefighting training.

Fire Protection Orientation
(2ASR57150-12) (1 wk): Designed for the Base Civil Engineer Officer (Fire Marshals) or officer personnel projected to assume the position.

Advanced Fire Protection Technology
Fire Chiefs, Deputy Fire Chiefs and Assistant Fire Chiefs. Presently in the initial planning stages. Course number and length will soon be established.

A/S32P-2 Firefighting Vehicle Operator
(4AST57150) (2 wks): Mobile Traveling Team.

A/S32P-4 Fire Truck Operation
(4AST57150-4) (2 wks): Mobile Traveling Team.

The Air Force shares the problem of solid waste disposal with local governments, and it may be only through intergovernmental cooperation that both arrive at an economically feasible solution.

Solid Waste Management

by Maj Ray D. Schwartz, PE

This is a common occurrence in almost every municipality in the nation. Refuse collectors dump debris into truck.

The magnitude of problems associated with solid waste disposal in the United States is reflected in the results of a recent questionnaire distributed by the National League of Cities—all 1,031 respondents (519 mayors and 512 councilmen) identified refuse and solid waste as their number one problem. A further indication is found in a 1974 survey by the International City Management Association (ICMA) in which one-third of the 754 cities (with a population in excess of 10,000) reported that the capacity of their landfills in terms of time was four years or less.

Many of these problems also exist on Department of Defense (DOD) installations which in many respects are similar to municipalities. Because of these similarities, the Air Force can, in many instances, predict the occurrence of problems on its bases by maintaining an awareness of what is happening in local governments.

The nature of the problem with solid waste disposal is such that most citizens have yet to become concerned. Because disposal is a hidden function of solid waste management, the citizen recognizes disposal as a problem only when it impacts on his personal life style and habits. The national concern for energy, however, is causing many citizens to look at refuse disposal as a potential solution to shortages of fossil fuels. Energy shortages impacting on the economics of the marketplace are making many previously cost-prohibitive methods now economically feasible for the derivation of energy from solid waste.

The problems of solid waste disposal will be discussed using the conceptual model in **Figure 1** as the basis for discussion. The reader should be aware that this model assumes collection of refuse by public (including Air Force) and private agencies but excludes consumer direct disposal; however, a modified submodel could be developed to include this disposal action, **Figure 2**, but consumer disposal would have a negligible bearing on the subject as it is presented here.

Some aspects of this article may not, at first reading, appear to be relevant to Air Force installations; however, with an understanding of the problem comes an awareness that the Air Force does share this common problem with local governments, and in many instances, it may be only through intergovernmental cooperation that both arrive at an economically feasible solution to the problem of solid waste disposal.

Crew/Truck Transport

The function identified in the model as crew/truck transport encompasses the collection and hauling aspect of solid waste management. Because

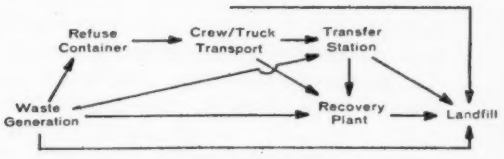


Figure 1: Conceptual Solid Waste Disposal Model.

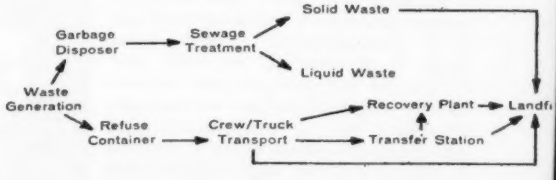


Figure 2: Modified Submodel.

this aspect of solid waste is labor intensive, virtually all current literature ascribes this function as the single area most ripe for increased productivity. The National Commission on Productivity's report by the Solid Waste Management Advisory Group estimates that the productivity of collection operations could be increased by 20 percent just through application of proven techniques. Since 80 percent of the 1968 total cost for solid waste operations in the United States was for collections, it is obvious that a 20 percent productivity improvement would have tremendous impact on today's costs.

In a 1972 study for the National Commission on Productivity, the Urban Institute sampled cities to determine variations in productivity and found wide ranges in cities which had comparable characteristics. For example, one city collected 88 tons of refuse per $1,000 spent whereas another city collected only 35 tons per $1,000 spent.

Standard 20 yard side loader truck equipped with special conveyor and articulated arm was developed for a Texas city.

Although in some instances the variations in productivity in the two studies mentioned above were attributed to outside factors such as topography, density and climate, most of the variations were due to performance. The common factor was management, and productivity problems were basically in five categories: crew size, routing, vehicle downtime, storage containers and manpower management and labor relations. Because many Air Force installations have collection accomplished by contract, detailed aspects of collection will not be covered; however, it should be noted that the crews and truck transport function have a potential for cost reductions with a big impact.

Transfer Station

As the name implies, a transfer station is a facility where the solid waste collected in standard size vehicles is transferred into larger vehicles for transport to the disposal site. This application has great potential for Air Force installations where an intergovernmental approach to solid waste disposal can be developed and has been successfully implemented at McClellan AFB, California.

Even though transfer imposes an extra handling step and a station is a capital investment, costs are usually recovered in a short time through savings generated by a reduction which can be made in the number of crews. An additional advantage of using a transfer station is that recent advances in technology have made it possible to modify transfer station equipment to incorporate limited resource recovery capability for materials. This negates the need to construct a separate facility to accomplish resource recovery.

Despite the advantages, there is one major difficulty in setting up a transfer station, and that is public acceptance. As with landfills, many citizens will lobby to have the transfer station built away from their homes, which of course defeats its purpose. Regardless of the difficulty anticipated, the advantages of a transfer station dictate that it must be assessed for potential savings when a solid waste management system involves any significant distances for hauling refuse, such as in an intergovernmental venture.

Recovery Plants

In the event a recovery function is not installed in the transfer station, a recovery plant may be incorporated into the waste disposal process. Although most Air Force installations do not generate sufficient quantities of waste to warrant construction of an on-base facility, recovery plants have increased in number in recent years as the nation's orientation on the scarcity of energy and natural resources becomes stronger. The recovery functions shown in **Figure 1** assume only post-collection recovery and the model does not acknowledge a pre-collection sorting and recovery at the generation point. This exclusion was based on the adverse economics involved in residential pre-collection, that is, additional collections, piece-meal handling, difficulty in obtaining citizen support, small quantities per collection point, etc.

There are three basic steps in resource recovery

MAJOR SCHWARTZ *is assigned to the Environmental Policy and Assessment Branch, Environmental Planning Division, Directorate of Engineering and Services, HQ USAF. He received his bachelor's degree in civil engineering from Drexel University and his master's degree in public administration from the University of Maryland. A registered Professional Engineer in Pennsylvania, he is a member of the American Society of Civil Engineers.*

of solid waste: size reduction of the waste, separation of the materials, and recovery and utilization. Because of the relative newness of mass resource recovery, innovations and new techniques are continuing to be developed, but systems already in the marketplace have demonstrated their value.

Size reduction of waste is normally accomplished by shredding, using a wide variety of equipment of which the hammermill is the most common. Shredded material attracts few vectors. It also extends the life of a landfill because it can be easily placed and compacted, requiring minimal or no cover; however, it requires the standard precautions for leachate control (liquid from ground and surface water percolating through the material).

The second step, separation, requires large quantities of waste in order to be cost-effective. Technology is making rapid advances from the predominate means of handpicking and sorting on conveyors used in 1969. Despite the advances, systems for separation of other materials are yet to be refined for marketing, other than a magnetic separator to pull out ferrous metals and air classification to segregate lightweight combustibles.

The third step in the resource recovery process, actual recovery of the material, is closely related to the separation step; that is, when the ferrous metals are separated, they are, for all practical purposes, recovered. The recovery of other materials such as paper, glass and aluminum still poses the problem of accomplishing it efficiently. EPA has demonstration projects in Franklin, Ohio, and in Lowell, Massachusetts, to investigate the viability of recovery of these materials. After two years of operation, it appears that the Franklin system of wet separation of solid wastes will be cost-competitive with incineration and also with long haul costs to landfills.

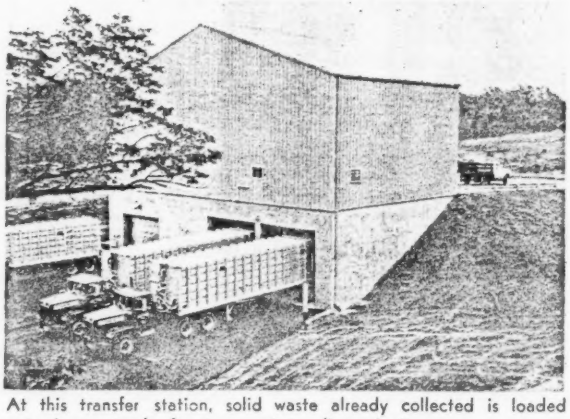
Another resource recovery method called pyrolysis is being explored. Pyrolysis is the thermal degradation of organic substances in an oxygen-deficient atmosphere and is cleaner, with more usable by-products than incineration. For example, the residue from pyrolysis is 50 percent less than for incineration; the oil by-product is expected to be storable and transportable; and the gases can be piped to a boiler as supplemental fuel.

A more conventional means than pyrolysis for recovering energy from solid waste is by incineration or as a fuel substitute. Refuse Derived Fuel (RDF) is refuse reduced in size and then air classified before being burned in conjunction with the fossil fuel. RDF in coal-fired boilers has been proven to be cost-effective. Burning solid waste directly as it comes from the truck is more difficult but there are systems on the market which make it possible. Because it is an emerging facet of solid waste management, resource recovery will be receiving much publicity and attention in the next two decades.

Landfills

The final function in the model, the landfill as a disposal site, is the most common method used, although some disposal is done at sea. For many years, most municipalities and many DOD installations operated open dumps and burned refuse to reduce the volume of solid waste. Environmental concerns during the past two decades halted this practice and the practical alternative became the sanitary landfill. However, a number of problems have become associated with landfills.

Probably the most difficult problem in developing



At this transfer station, solid waste already collected is loaded onto larger trucks for transport to disposal site.

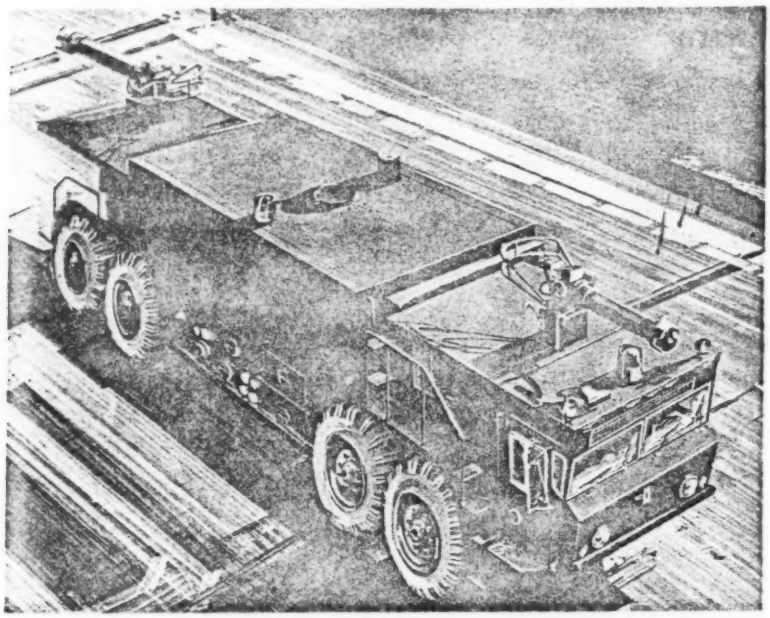
a landfill is finding a location which is publicly acceptable and also acceptable in terms of travel distance, load limitations, bridge capacity and geologic considerations. The key is in obtaining the public's acceptance because opposition by local citizens eliminates up to 90 percent of all proposed sites. This lack of sites for landfills has become a major factor in solid waste disposal.

Other problems which relate to the desirability of operating a landfill are the rigid standards necessary to ensure that no environmental degradation occurs; the settlement of a completed landfill; gases which may be produced during decomposition of the materials; the pollution of ground water and/or surface water by leachate; and obtaining cover materials to achieve vector control.

Completed landfills can be used for recreational purposes such as parks, playgrounds or golf courses. Also, they have been used for storage areas, parking areas, and on occasion, for one-story buildings, although this is not recommended because of the potential for settlement problems unless piles are used, a costly procedure.

Despite these difficulties, landfills are an essential part of solid waste management systems and have been used effectively for community enhancement projects. The critical factor in landfills is to find an effective method for reducing the volume of waste for disposal. (cont'd on page 36)

A tremendous step toward assuring that the Air Force crash rescue/ fire fighting capability is keeping pace with the times is . . .



THE P-15

. . . soon to be the largest production crash-fire vehicle in existence

"Airplane crash fire fighting is a specialized, hazardous, and extremely important branch of the science of combating fire. Wherever an airplane crashes, fire must be expected. The fire is usually of extraordinary speed and violence. Rescue operations, far from being uncommon, are normal, and since any crash is likely to injure and imprison crew members, rescue work assumes paramount importance. Nowhere—not even in ordinary fire fighting—do seconds count for so much.

"So, airplane crash fire fighting calls for exceptionally good men, mentally, physically, and spiritually. They must be well-trained and fast-thinking, hardy and quick-acting, and above all unshakably determined to save life.

"Success depends upon apparatus and equipment especially developed for crash fire fighting and a high degree of skill in its use."

Only a handful of Air Force fire fighters today will recognize the above excerpt from the 1944 War Department Technical Manual, TM-5-316, entitled "Airplane Crash Fire Fighting." Such emotionally-charged language won't be found in current technical publications. But the truths so described endure.

The crash rescue services provided during World War II were the very best available. Highly spirited and well qualified fire fighters were equipped with the most advanced apparatus and tools that the technology of the day could produce. An evaluation today would be similarly reported. In retrospect, the continued maintenance of an effective and efficient fire service is seen as a most difficult task. As increasingly sized aircraft entered the inventory with larger and larger fuel, weapon and passenger loads, the fire service was hard pressed to keep pace with the growing hazard and risks brought with them.

In the early days, it was sufficient for the crash rescue crews to gain control of a fire situation only long enough to permit their entry into the aircraft and rescue or remove those aboard. Today, however, temporary control of the fire for a short period will not permit evacuation of personnel from a large aircraft. The large fuel loads develop into fires uncontrollable with yesterday's equipment and techniques. As these conditions were being experienced for the first time by the crash crews, it became apparent that advances and improvements in both the fire fighter and his equipment were necessary.

Step by step, over the years, the present crash rescue capability was developed. Air Force fire fighters are well trained, the best equipped and provide their services with only half the number of personnel previously required.

Several avenues led to the level of capability now present in our crash rescue functions. Protein foam, a fuel-surface blanketing agent, was entered into the inventory and used in equipment designed for water. Soon, special-

ly-designed vehicles were provided and these remained standard for 20 years.

Fire fighter training was intensified at all installations; formal and extensive training programs were developed and provided at the Fire Protection School at Chanute AFB, Illinois. Pre-fire planning was extended to aircraft fire situations and contributions by structural fire forces stressed.

The introduction of the C-5 aircraft required still further increases in fire protection efficiency and effectiveness. Technology had some of the answers to the problems posed. A new extinguishing agent, Aqueous Film Forming Foam, often described as "A-triple-F" sparked anew our drive to full capability. This agent of superior extinguishing capability flows over and blankets burning fire surfaces much quicker than protein foam. We saw immediately the possibility of quickly gaining and maintaining control of a fire situation and allowing a fast but measured evacuation and rescue of aircraft occupants. Additionally, much more of the aircraft could be saved from the ravages of fire.

The new agent was provided our fire departments and the results were as expected. Our fire fighting performance improved so dramatically that serious recommendations were made for further reductions of personnel and in-service apparatus. Had we been satisfied with the level of protection possible with the once used protein foam, the A-triple-F would have allowed a 20 percent reduction in fire department operating costs. It was argued, however, that the newfound capability approached that which was necessary and such reductions would negate our past improvement actions. In fact, full capability was within reach and this movement should not be aborted. Greater quantities of extinguishing agents were required.

At a 1970 Civil Engineering Equipment Advisory Group meeting, major command fire protection staffs cited a long overdue need for once again upgrading our vehicle fleet by replacing time-worn vehicles. An Air Force study into this and a determination of what was needed and its cost-effective acquisition soon followed.

It was found that a new vehicle of sufficient fire fighting agent capacity, simple in design and operation, could in a limited number be assigned to permit a redistribution of other apparatus and provide the desired full capability of our crash rescue services.

The Tri-Service Systems Program Office for Aircraft Ground Fire Suppression and Rescue (AGFSRS), at Wright-Patterson AFB, Ohio, was therefore tasked with the development and eventual procurement of the new vehicle. AGFSRS accepted the task and, joined by the programmed using commands, the Civil Engineering Center and the Air Force Directorate of Engineering and Services developed performance specifications for a large capacity crash apparatus.

General Characteristics of the P-15 (A/S32-P15)	
Length	43 Feet
Width	10 Feet
Height	13.75 Feet
Weight (In-Service)	125,000 Pounds
Wheel Base	25.30 Feet
Draw Bar Pull	86,000 Pounds
Drive Engine (2-Diesel)	430 HP
Capacity (Water)	6,180 Gallons
(Foam)	515 Gallons
Capacity (2-Pumps)	2,500 GPM
Crew	3 Fire fighters
Acceleration (0-50 MPH)	45 Seconds
Air Transportable	C5A Aircraft

To test all the theories that pointed to this type vehicle as the one required, a commercially available vehicle was leased and put through its paces. Operational tests involving large scale fires and adverse conditions of all kinds were conducted. The vehicle, later purchased and placed in-service at Travis AFB, California, supported the thinking that it could and would meet all requirements within the realm of economic feasibility.

The specifications were further developed, the vehicle budgeted for and initial procurement funded. Vehicle manufacturers were asked to provide designs to meet the specifications. The response was good. The Source Selection Committee made up of those involved in the specification development met and worked hard and diligently in selecting the vehicle to be procured.

The pictured vehicle, now designated as the A/S32-P15, is an artist's concept of the selected apparatus. With no increase in total manpower needs, its assignment to some 50 installations will allow an increased fire suppression capability of 18 to 40 percent at all flying installations through redistribution of existing crash-fire vehicle assets.

The P-15 will be the largest production crash-fire vehicle in existence. Only a few custom-built vehicles will surpass it in size and capacity.

Those first built will be subjected to severe and thorough testing. Operational procedures and practices will be developed and polished to insure the maximum benefits of full utilization. Assignments to the various installations are scheduled to begin in mid-1978.

The P-15 will be manufactured by the Oshkosh Truck Corporation, builders of the now familiar P-4. The latter, with only minor differences, is now seen at civil airports throughout the world. It is expected that a civilian version of the P-15 will also become a global standard.

The realization of the P-15 will be a tremendous step toward assuring that our crash rescue fire fighting capability is keeping pace with the times. E&S

A considerable amount of high value Air Force materiel used in the Southeast Asia conflict has been retrograded. In terms of replacement costs, it amounts to millions of dollars.

MAKING RETROGRADE COST EFFECTIVE

by Lt Col Barry W. Jenkins

Thailand, the location of six major Air Force bases at the height of the Vietnam War, is being phased down. During this period we have gained considerable experience in the retrograde of millions of dollars of relocatable assets. Also, we have had time to ponder the policies which guide this program, and you can decide for yourself whether you think the taxpayer is getting a fair shake.

We all remember incredible stories following World War II about the fantastic amount of new materiel abandoned, even dumped into the ocean by US forces after V-J Day. In Korea, on the other hand, most of what we had used in the war continued to be used by our own forces who remained on scene. In Vietnam, much of our high value materiel was turned over to the South Vietnamese. A considerable amount, however, was retrograded. Based on need at the time and relatively low construction costs, the majority of these assets were shipped to Thailand, Korea and the Philippines.

Items relocated included many modular facilities built expressly in support of the US effort in Southeast Asia. Modular facilities consist of dorms, chapels, hospitals and dining halls. Large numbers of nonmodular, but just the same relocatable, preengineered buildings (PEBs) were also retrograded. Naturally, with the hot and humid climate in Southeast Asia, there were also a great many air-conditioning systems.

Today we can point to buildings at base after base which originally saw duty in Vietnam. Some are on their fourth location, which is really getting a lot for the tax dollar. Additionally, though not as visible, we find a large number of air-conditioners, generators, transformers, trailers and numerous other high value assets which the layman might refer to as "second hand." In many cases, retrograde made possible the meeting of vital requirements which would otherwise not have been possible. This point should not be minimized. Despite austere budgets, numerous projects were in fact the sole result of the opportune availability of materiel from Vietnam. That is the good news.

While proud of example after example of cost effective management of Vietnam retrograde, our efforts have not been without an occasional setback. Our rationale had been based on two points: if the South Vietnamese did not have to have it and it was good enough to reuse, then we moved it. On the surface, this sounded good, but everything we took was not needed. Although the percentage was not that great, when stacked in two or three piles, which it literally was, it proved to be an albatross not soon to be forgotten.

With little or no protection from the elements, much of what we do not put to use becomes instant junk. Air-conditioners and power generation equipment, even when protected from the elements, deteriorate rapidly from lack of use. Located in places where pilferage is an ever present problem, parts—electrical, plumbing, hardware, etc.—tend to disappear at an alarming rate. And this will occur even while they are under guard. Additionally, such items are naturally looked to by our own people as a source of spare parts for other projects under construction. It would not be long before that was all it was good for—spare parts. Considering the vast sum of money saved through retrograde, you may feel that these residual piles would be a small price to pay. Unfortunately, although the program has been an unquestioned cost effective success, movement of what is destined to become junk is wasteful and should not happen.

Approach Revised, Refined

In Thailand, we have revised and refined our approach to retrograde. At the start we came to the realization that the simple determination of whether an item was good enough to relocate was not in fact simple. The Air Force has an exacting system for rating a facility in terms of its condition. Simply stated, it is a matter of degree: excellent, satisfactory, poor, or lastly, unusable. Condition itself is not necessarily the most logical factor to base suitability for retrograde. A building with one wall missing may still be ideal for relocation. If it is a matter of skin damage, skin condition is not really that significant a factor. New skin can be purchased or replaced with a locally constructed replacement. On the other hand, a building in excellent shape may have been modified in a manner which would make movement out of the question. The frame may have been welded or set in concrete. It may have permanently installed partitions.

Normally, this poses a problem; however, in Thailand it is actually an asset. Local contractors will lower the cost of disassembly depending on the amount of partitions and other residual material which they are allowed to keep for themselves.

An air-conditioning system may be coded as unusable due to an inoperative component. Regardless, the remainder of the system may still make relocation extremely cost effective. By the same token, a system in excellent operating condition may, due to its age, not have remaining service life to make relocation worthwhile. This was also found to be the case with power generation equipment. Additionally, certain power plants in Thailand, though operating effectively, were not earmarked for retrograde due to the nonavailability of spare parts to maintain them.

House Trailer Disposition

An interesting situation involved the disposition of several hundred house trailers which had been moved from Vietnam. Although most were in serviceable condition, they had been subjected to long use in damp climates, in areas of termite infestation. As a result, they were determined not to be worth relocating. This judgment was confirmed when a couple thought to be in the best shape were moved. Due to the long-time effects of rot, cracking and termites, they did not survive the trip and had to be salvaged.

Even when we are able to match a building with a valid project, we are still faced with problems. For use on Guam and Okinawa, we have to construct buildings capable of withstanding winds up to 185 knots. Our structural engineers have a ready solution for this dilemma. We typhoon-proof buildings by placing the structural members half as far apart as for normal construction. Of course, you end up with a considerable amount of surplus skin when you do this. Fortunately, we have not had to retrograde in the reverse direction (from typhoon to non-typhoon areas). Then we would have the problem of skin shortages or, depending how you looked at it, a surplus of the most costly steel superstructure.

In relocating structures from Southeast Asia to Korea or Japan, we have the problem of inadequate insulation for the cold weather, As a matter of fact, regardless of where we relocate a facility, even within the tropical area, new, more stringent U-factor requirements dictate that all new construction meet insulation standards whether for heat or air-conditioning. Therefore, since all PEBs erected in the future will be insulated, the problem of warm-to-cold climate retrograde will be eliminated.

At this point, the "we" that has been referred to should be defined. Air Force assets not earmarked for retrograde to satisfy Air Force requirements are made available to the other services and other agencies of the US Government. As a matter of fact, the Navy and Army are the recipients of significant quantities of retrograde from Air Force bases in Thailand.

COLONEL JENKINS *is Chief of the Plans and Requirements Division, DCS/Engineering and Services, Headquarters Pacific Air Forces, Hickam AFB, Hawaii. He is a graduate of The Citadel with a degree in electrical engineering.*

The most significant change in the retrograde program involves the requirement that we do not relocate anything unless we have a viable project for it. In other words, we do not take something merely because it is in retrograde condition. We have to be reasonably assured that we will in fact use it. Up to this point, we have said that a bargain is not a bargain if you do not need it. We also say that is not a bargain if you cannot afford it. Cannot afford a free building? That is correct. Even though retrograde assets are in effect free, the costs involved, all too frequently, are more than we can afford. Funds may just be above statutory limitations. In Japan, the cost for the foundation alone may approach cost limitation.

Lastly, we have found that retrograde, even of serviceable assets, is not always cost effective. To the planner, who thinks in terms of funded costs, this may not be as readily apparent. When all costs associated with retrograde are considered, costs to the US taxpayer may be excessive. These include disassembly, packing, land and sea transportation, and handling charges. Such costs for retrograde within the Western Pacific average approximately $2.00 a square foot. From Thailand to Hawaii they are $2.40 a square foot, and Thailand to the CONUS $2.75 a square foot. Storage costs are additive. When considering the fact that we are relocating aged assets which generally require a substantial rehabilitation, the determination of cost effectiveness becomes critical and must be made on a case by case basis.

Even with the exacting requirements we have set for retrograde, we anticipate that the major portion of all assets worth retrograding in Thailand will be relocated. This amounts, in terms of replacement costs, to over $100 million, all being used to fill valid requirements. And those items which we leave in place in Thailand will be put to use by our friends there rather than becoming scrap that has been disassembled, packed and transported at the expense of the US taxpayer. E&S

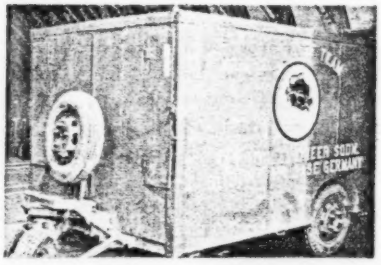
USAFE engineers have demonstrated how to improve and upgrade the readiness posture of their mobility forces. Here is a report on

Prime BEEF in Europe

by Maj Charles F. Kreis, EIT

Prime BEEF (Base Engineer Emergency Forces) mobile teams have a significant role to play in the combat readiness of the Air Force and in the ability to "fly and fight" anywhere in the world. This role will take on added significance in the years ahead, particularly in the post-Vietnam era, characterized by the draw-down from Southeast Asia and the increasing focus of the United States on areas of the world where few or no military installations exist (Eastern Europe, Africa and the Middle East).

Within Europe, civil engineering is acutely aware of the crucial role the C Team plays in USAFE's mission of security and defense within the big picture of NATO. Because of the strategic closeness of USAFE to current trouble spots, both old and new, where Air Forces could very well be called on to play a part, teams stationed in Europe should make every effort to find ways to improve and upgrade their readiness posture. **AFR 93-3** and **AFM 93-6** provide the basic directives and criteria for the readiness and capability of the teams. Generally, the regulation allows 28 hours from first notification



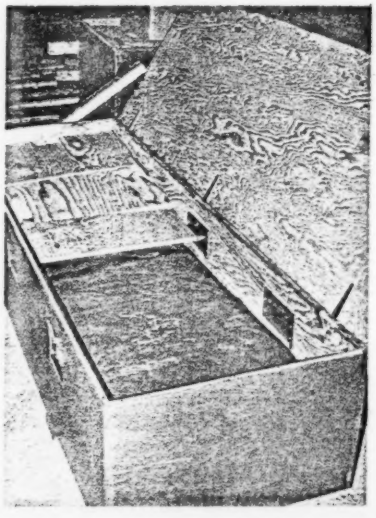
Trailers which are less than 8 feet high easily fit into C-130 aircraft.

until the full team and its equipment is expected to be loaded and enroute to its destination. However, the regulation adds that under unusual circumstances the warning time could be considerably less.

With this in mind, the 36th Civil Engineering Squadron (CES) has tried to increase and maintain its team readiness at a high level and to cut down on reaction time. The two areas where most of the effort was focused were on mobility and organization. To the 36th CES, mobility means having everything on wheels able to roll at a moment's notice. All equipment is either wheel mounted, permanently carried on modified bomb trailers or stored in specially fabricated house trailers. And organization means, "Having a place for everything and everything in its place." All of the team's equipment has a carefully thought out place to be, either in permanently labeled boxes, in a specially reserved area in the house trailers or on flat bed trailers.

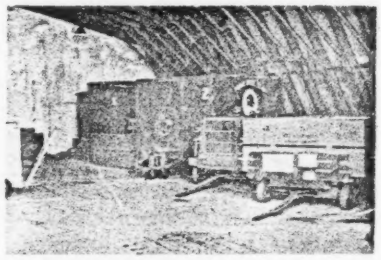
Although the 36th CES has completed improvements in the mobility and organization of the

A tent box with top layer removed reveals divider/shelves and tent.



team, the primary purpose of this discussion is to pass along two ideas in the development of its mobility concepts. These ideas, a multi-purpose tent box and two super-organized SMART-type trailers, have dramatically reduced storage and handling problems and definitely have speeded up response time to a deployment situation. In addition, these two containers have reduced inventory problems for the small, easy to lose items, and they offer good protection from damage and theft of critical items of equipment.

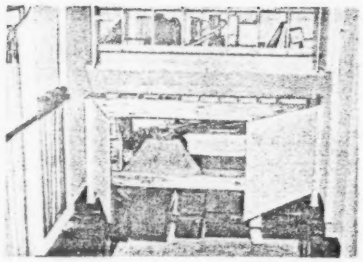
The original motivation behind the development of the tent box was to have a convenient place to store and transport the 12 man general purpose tents. But as the design of the tent box was worked out, it became possible



Prime BEEF equipment is lined up in this configuration, ready to go.

to make it the exact size to store the team's cots and mosquito netting and poles. The box design was originally suggested via an AF Form 1000 which was the result of considerable observation, thought and experimentation by one of the Squadron's most experienced team members, who was also the C Team instructor.

Each tent box measures 27 by 18 by 85 inches (outside dimensions) and permits the organized storage of one complete 12 man tent (including ridgepole, pins, braces and ropes) or 24 cots or 60 sets of mosquito netting with poles. Under the old system, all of the tents were carried in the trailers; however, the other parts were packed in cardboard boxes and scattered throughout the rest



Interior of a trailer shows how cabinets and storage racks are built-in.

of the cargo. The cots and netting were also packed in cardboard boxes and, they too, were scattered throughout the load. This caused the problem of either not having a good inventory on the equipment or not knowing where to find all the parts when the team got to the deployment site. Now with these boxes, in order to lose a tent part, you have to lose a whole box. Also, not only is inventory, storage and transportation simplified, but packing up for redeployment is easier and faster.

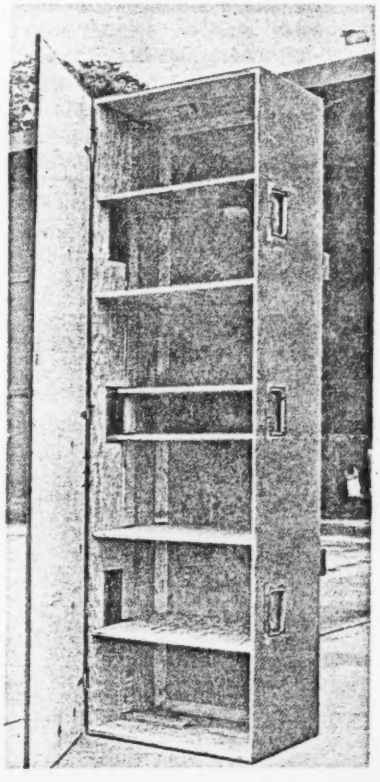
The tent unit fits easily into a box, the tent itself in the bottom two-thirds, a set of dividers next (which doubles as shelving in the box later on) and the ridgepole, pins and other items in the top third. The only modification needed on the tent assembly to make all the parts fit into the box is to the ridgepole. This is a simple procedure which will be passed on to those interested who write to 36th CES, APO NY 09132.

If the box is made according to specifications, it is the exact size to store 24 cots (two tent's worth) laying them in two layers, four long by three wide. Finally, one box is also just right for storing 60 sets of mosquito netting kits which is enough to supply the whole team. A regular 60 man C Team then would need six tent boxes, three cot boxes and one box for mosquito netting for a total of 10 boxes.

Once the team arrives at the deployment site, unpacks and sets up, the boxes are not just stored; instead, they can be placed on end in the tents and quickly converted to locked, shelved, storage chests. When the contents are removed, and the boxes stood on end, the six plywood dividers (which come with each box) are removed and replaced as shelves. The shelves are supported in the box by special slots cut into the gussets between the back sides and the two stiffeners positioned midway on each side of the box running the length of the box. Detailed instructions for construction of the box, like the ridge pole mod, will be supplied on request. The storage provided by the box when used as a cabinet is not intended for personal storage, but for small issue items of tools and equipment which the team members carry around with them, that have a habit of disappearing.

The boxes also have signifi-

A tent box set on end doubles as a storage cabinet with shelves.



cantly improved the ease with which the tents are unloaded and moved to the campsite. When they were stored in the trailers, it took considerable struggling, pushing and carrying to roll each tent out of the trailer and carry it to the campsite. With the boxes, struggling is no longer required. Each box has six metal fold-out handles, allowing six men to easily lift and carry one complete tent, or the 24 cots, or the netting from the unloading site to the campsite. When they get there, they have one complete unit, ready to be set up. At Bitburg AB, Germany, the Squadron made its boxes out of 5/8 inch and 3/4 inch marine plywood. The weight of each box is about 60 pounds.

Once the boxes were made and tents and cots packed away the Squadron turned its attention to updating its mobile house trailers. Originally home-built, these trailers use the same chassis as those used to build SMART trailers. Starting with the basic shell, the Squadron built numerous compartments, shelves, cupboards, drawers and tie-downs to hold all the items that usually end up in boxes. In one of the trailers, for example, the Squadron placed 10 sheets of plywood, two coils of rope, five rakes, five shovels, linemen and electrical equipment, a large first-aid kit, three sledge hammers, three battery powered lights with a large supply of batteries, and 30 or so other items such as nuts, bolts and nails. Also, 20 individual tool boxes were included.

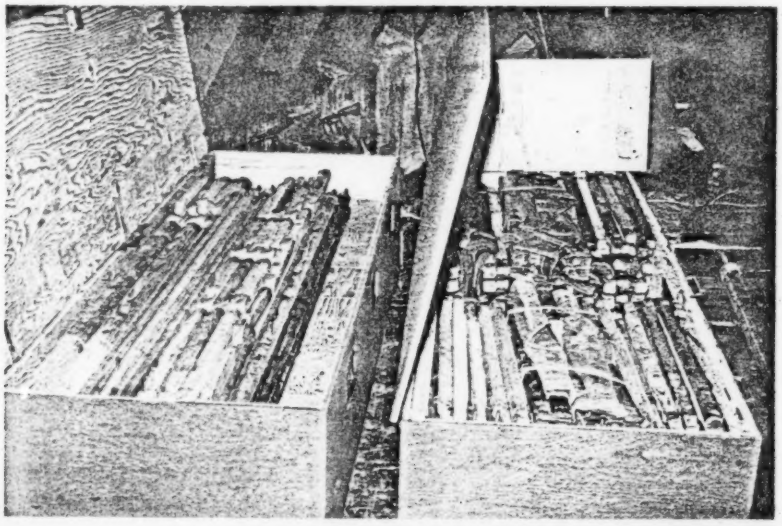
All of the items are stored in compartments or strapped with tie-downs so that the trailer can be airlifted without the fear of items coming loose and bouncing around enroute. With all this inside there is still sufficent floor space for a built-in work bench with vise attached. There are drawers in the work bench to keep drawings, blueprints or other valuable papers, and there is a 110 volt lighting system with external plug-in which will run off the portable generators or commercial 220 volt European power with a transformer (included). The other trailer is configured similarly except that it carries different items and only 19 tool boxes. This trailer also has a work bench and lighting system. A fully loaded trailer weighs in at about 7,000 pounds. There are no significant limitations on loading the equipment for aircraft deployment. The trailers are all less than eight feet high and therefore, fit easily into a C-130, and all the equipment is deployable with the team members in two C-130 loads.

In summary, the 36th CES believes that its Prime BEEF C teams will become more important in the future. The ability to respond effectively and efficiently in an absolute minimum amount of time to a Bare Base and have it ready to go for the operations types is an essential facet of the mission and everything must be done to enhance this ability. With the day-to-day panics, problems and frustrations inherent in the civil engineering business, it is too easy to let this essential Air Force designed capability slip, but we must not if we are to do justice to the mission. To develop your teams and their equipment to a high state of readiness will require advanced planning and the assignment of sufficient manpower and material resources to make it work. The ideas suggested here are working for the 36th CES and they have added substantially to its combat ready capability. For others, all that is suggested is to try, and good luck!

E&S

MAJOR KREIS *is a Civil Engineering Officer with the 36 Civil Engineering Squadron, Bitburg AB, Germany. He has a degree in aeromechanical engineering and is an Engineer-in-Training in Ohio. He is presently the Prime BEEF C Team Manager for his squadron. He has held positions in various rated specialties and has served as a structural engineer in Air Force Logistics Command.*

The interior of a tent box reveals two configurations. The box on the left holds a tent and poles, the box on the right contains cots.



Although what follows is an assessment of the success of the Career Management Team at the Military Personnel Center, it is necessary to continue to improve our blueprint for officer career management and the ability of civil engineering to meet its global mission.
PALACE BLUEPRINT:
SIX YEARS LATER
by Lt Col Marvin T. Howell, PE

A Career Development Division was established at the Air Force Military Personnel Center (AFMPC) in July 1967 that included a civil engineering representative. The charter objectives were to:

- Use functionally oriented officer(s) to manage careers.
- Close the communication gap between the officers in the field and the AFMPC.
- Interface career development into the assignment process.

Under this concept, the civil engineering representative worked on career development guides and information, discussed career plans, and career monitored officers. Although he did recommend assignments, an individual assigned to a different division actually made the assignments.

Maj Gen Guy H. Goddard, then Director of Civil Engineering, was pleased with the career development efforts being made but felt a new approach was needed—a team approach, placing the assignment officer (resource manager) and the career development officer together to make coordinated end assignments to a specific job (instead of allocating an officer to a major command for subsequent assignment to a base and job). In a January 1969 letter to AFMPC, General Goddard recommended the establishment of a civil engineering career management team. In October 1969, a two year test was initiated to try this concept. The team was named PALACE BLUEPRINT and had four functional officers assigned. After only one year, the decision was made to institutionalize this new concept. Today, there are 16 PALACE teams (support officer career fields) with only the research and development career fields remaining to be implemented.

PALACE MODE CONCEPT

What was this new PALACE mode concept? A system of **coordinated end assignments** that permitted for the first time functional participation at both Air Staff and major air command levels. The team concept assured that assignments were made with full consideration of the job requirements and the individual's experience, performance, aspirations, potential and future needs of the Air Force. Career development was interfaced with the assignment process. The PALACE teams became an information and career planning focal point for officers. The basic objectives were to:

- Use total civil engineering officer resource in filling requirements.
- Have equitable distribution of talent.
- Select the job for each officer.
- Develop unique capabilities of officers.
- Balance assignments between base and staff level.
- Provide career visibility.
- Improve retention.

The primary objective was to develop the executives required for tomorrow while satisfying today's needs. This objective fits well with our utilization goal to "Put the right man in the right job at the right time" and the career development objective of "Develop the skills and talents of officers to meet the needs of the Air Force."

PALACE BLUEPRINT'S TRACK RECORD

We believe this personalized management system has met its objectives and that we are better satisfying Air Force requirements and peoples' aspirations than ever before. The team is making coordinated end assignments with the major commands and other departmental/joint agencies to a specific job. Each civil engineering officer is provided equal career progression opportunities commensurate with his capabilities. This has assured more rapid development of an officer's engineering

Figure 1: Academic Education—Highest Level.

	1969	1975
No Degree	6.0%	0.8%
Bachelors	64.0%	57.2%
Masters	28.0%	40.0%
Doctorates	2.0%	2.0%
	100.0%	100.0%

and managerial potential. In the past, allocation of officers to major commands for subsequent station assignment too often meant that the better known officers received Staff assignments, while other equally capable officers were being assigned continuously at base level. Today, rotation of officers between base and Staff level positions is now controlled and managed.

The career development needs of each officer are considered every time we make an assignment. Milestones and career progression guides are published in AFR 36-23. The availability of the total resource for assignment consideration provides the essential flexibility to better match jobs with other people while also assuring equitable overseas service and a balance of talent between commands.

Communication has been greatly expanded. Each month we receive approximately 1,300 telephone calls (many from officers interested in transferring to our career field or seeking a rated supplement assignment). We respond to written inquiries by averaging 73 letters or card replies monthly, and individually discussing officers' careers with about 20 to 25 walk-ins (monthly) to our office. Regardless of what you may have heard, we personally consider your career objective statement, AF Form 90, when we make your assignment.

In addition, we brief each Base Civil Engineering Course and some Staff Civil Engineering Courses at the Civil Engineering School, Air Force Institute of Technology, Wright-Patterson AFB, Ohio. We also attend many of the major command Engineering and Services Conferences, and make "spread-the-word" trips to locations where there are large numbers of civil engineering officers, such as the Civil Engineering Center, Tyndall AFB, Florida, and the Air Force Weapons Laboratory, Kirtland AFB, New Mexico.

CHANGES IN OFFICER MANNING

Let us focus on a few key parameters of our officer force and note the changes. Let us mention some manning shifts in our career field since 1969. The field grade manning has increased from 59 percent to 93 percent. Although reduced authorizations have contributed to this increase, the actual number of field grade officers on hand in 1975 is greater than in 1969. Increases in hard-to-man disciplines such as electrical engineering, architecture, architectural engineering, industrial engineering and mechanical engineering have been achieved, but much remains to be done in that our company grade manning in these areas is less than 90 percent (authorized/assigned).

Figure 2: PME—Percent of Total Force (Highest Level)

	1969	1975
SOS or higher	33%	49%
Intermediate Service School	10%	21%
Senior Service School	4%	10%

Figure 3: Fully Qualified AFSC

	1969	1975
Colonel	73%	74%
Lt Colonel	90%	78%
Major	59%	79%
Captain	52%	78%
1st Lieutenant	30%	65%
2nd Lieutenant	0.9%	0%
Total CE Officer Force	40%	68%

RETENTION

The percentage of the total number of officers completing their initial tour and electing to continue on active duty has increased from 31 percent to almost 50 percent. With today's early-out programs, we are not experiencing normal continuation or retention rates. Once the force becomes more stable, higher retention rates may be achieved. We recognize that there are many factors other than career management that affect retention, that is, pay increases, economy, unemployment rate, people programs, commander's interest, to name a few. But establishment of two-way communication with officers in the field, more participation in their assignments via AF Form 90, better person/job matches, career visibility and more information available on career progression patterns and opportunities could also be contributing factors.

ACADEMIC EDUCATION

Our officer force is one of the most highly educated career fields in the Air Force, **Figure 1.** Forty percent of our officers have a masters degree and two percent possess a doctorate degree. Less than one percent have no degree. Every officer entering our career field today has an architectural or engineering degree. (cont'd on page 36)

COLONEL HOWELL is a Career Management Staff Officer and the PALACE BLUEPRINT Team Chief at the Air Force Military Personnel Center, Randolph AFB, Texas. He earned his bachelor's degree in mechanical engineering from Mississippi State University and his master's degree in industrial engineering from the University of Pittsburgh. He is a registered Professional Engineer in Alabama and is a member of several professional societies.

Here are some helpful suggestions for the base electrical engineer who must provide for the proper installation and operation of an underground electrical distribution system.

Underground Electrical System Testing: A Review

by Capt Michael A. Aimone, PE

A high voltage underground (UG) electrical distribution system can provide a greater degree of electrical power reliability than an overhead system. For example, wintertime ice storms can mechanically overload the overhead electrical system, causing an electrical outage. This type of severe weather does not effect underground electrical distribution construction; however, to maintain the high degree of power system reliability provided by the UG electrical distribution system, the base electrical engineer must provide for its proper installation and operation, including periodic testing of the underground cables for incipient cable insulation failure.

This article describes an electrical maintenance testing procedure that should be considered with any UG electrical distribution system. The procedure is recommended by the Insulated Power Cable Engineers Association, the Edison Electric Institute and AFR 91-4. The following paragraphs suggest a periodic testing procedure as a means of projecting the useful life of underground cables and as an aid in the programming of replacement of marginal cable.

The purpose of the electrical testing procedure is to establish the integrity of the UG system insulation to withstand overvoltage transients associated with proximity lightning strikes and power system switching surges. Periodic maintenance testing of the UG electrical distribution system provides the base electrical engineer an historical profile of the time rate of UG system insulation deterioration. Based on this time rate of insulation deterioration, marginal UG cable can be replaced before the occurrence of a failure. Electrical maintenance testing is considered a controlled nondestructive testing procedure. Insulation integrity is maintained during the test procedure. Marginal cable can be placed back into service and plans can be initiated to replace the marginal cable during a convenient scheduled time period.

The reliability of an UG electrical distribution system is dependent on the viability of the cable system's insulation. Insulation deterioration can be the result of age, chemical attack, mechanical damage or electrical overload conditions that result in the evaporation of the insulation plasticizer, causing the insulation to shrink or crack. Marginal UG cable insulation results in uneconomical power losses via inadvertent leakage currents through the insulation. The non-destructive high voltage testing procedure to be described is a means of determining the magnitude of leakage currents, hence, the viability of the insulation. Based on the trend of a series of high voltage tests on a cable, the useful life of the cable can be projected; thus, replacement cable can be programmed eliminating an unscheduled electrical outage.

Specialized equipment and trained personnel are required to perform the high voltage insulation test of an UG cable system. Direct current (DC) high voltage tests are generally performed due to the compactness and low power requirements of this equipment. However, cable manufacturers may use alternating current (AC) high voltage equipment and procedures during factory quality control tests. The test set consists of an adjustable high voltage source, instrumentation package and electrical safety equipment. The high voltage source provides the high voltage potential that stresses the cable insulation. The instrumentation package provides information on the magnitude of the applied voltage and associated current flow on the cable. The electrical safety equipment provides for safe grounding of the test set frame during test, and a means of discharging the stored electrical energy upon completion of the test procedure. Figure 1 depicts a typical equipment configuration. The instrumentation package meters the return currents on the cable. This metered return current consists of three components:

- Geometric capacitance current component with

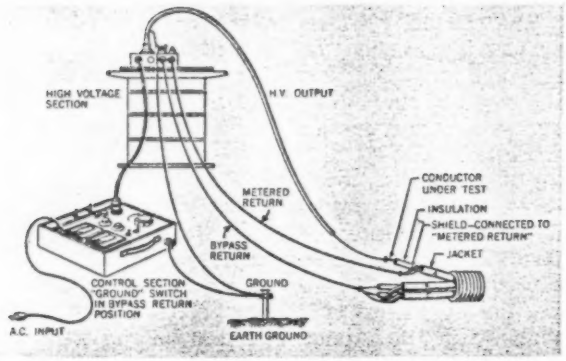


Figure 1: Typical high potential test connections for testing three conductor shielded cable. Drawing shows test of phase "A" to Shield.

a time constant*—the time for the current component to fade away—about three to five seconds;

- Absorption or polarization current component with a time constant equal to the duration of the test; and
- A leakage current component which has no time constant relationship.

Actually, the leakage current component is the important metered current value. The leakage current is the amount of current that flows out through the insulation of the cable, and hence, is lost to the system. The three current components cannot be separated; however, by allowing the time dependant components to completely fade away, the resultant current metered is the leakage current.

The test procedure is appropriately named the Step Voltage Test. A maximum DC test voltage is established, based on the type and age of the cable insulation; these maximum test voltages are usually recommended by the cable manufacturer. **Table 1** lists one cable manufacturer's recommended test voltage values for polyethylene cables.

The maximum test voltage is divided into approximately eight equal voltage increments, and is impressed on the open circuited cable. After each voltage increment, the current flow through the instrumentation package is noted. As previously mentioned, the metered current has a leakage component and two time dependant components. After each step voltage increment, a pre-selected time interval is allowed to pass before the current is measured. Although the capacitance and polarization current components are still present to some degree, by allowing an equal time period after each

*The time constant is defined as the time required for the voltage to discharge 63.2 percent of its fully charged voltage. The cable is considered to be fully discharged after a period of five time constants.

Table 1. Recommended DC Proof Test Voltages (15 Minute Test).

Polyethylene or Cross Linked Polyethylene Shielded Cables

Rated Circuit Voltage	Insulation Thickness (Mils.)	Proof Test Voltage (kV) Installation	Maintenance
2001-5000	90	25	19
5001-8000	115	35	26
8001-15000	175	55	42
15001-25000	260	80	60
25001-28000	280	85	64
28001-35000	345	100	75

voltage step to elapse, the time dependant current components play no significant role.

As the step voltage test procedure is continued up to the maximum recommended DC voltage, the values of the step voltage and metered current are plotted. **Figure 2** displays a typical test plot for a cable with an incipient failure in one phase. It is important for the testing operator to observe the point of tip up associated with incipient failure—step voltage increased to the next voltage increment could possibly fault the cable, rendering it unusable for service. **Figure 3** displays the voltage versus current plot for a good cable. Upon completion of the step voltage test prior to discharging the cable, the maximum DC test voltage is allowed to remain on the cable for 15 minutes. During this time the metered current is recorded. Any sudden rise in the current suggests marginal cable. The test should be discontinued immediately upon noting any sudden rise in current.

As with all high voltage electrical work, on-the-job safety must be adhered to. Cables to be tested must be de-energized and isolated from service equipment and accidental personnel contact. Test equipment grounding must be adequate. The cable stores electrical energy via the time constant effects of the polarization and capacitive components of current. The cable must be allowed to discharge this energy. The capacitive component can discharge its energy within 15 to 20 seconds; however, the polarization component requires a much longer

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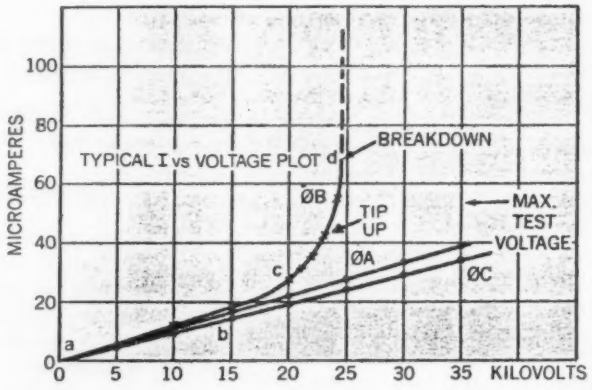


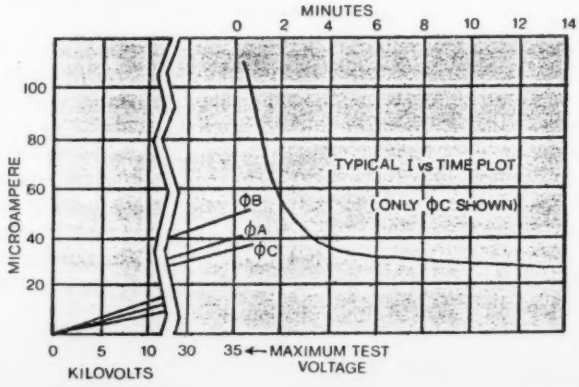
Figure 2: Typical leakage current vs. voltage curves for a DC high potential maintenance test on a cable in service. Tests show failure of phase B at 24 KV.

discharge period—up to four times the total duration of the testing procedure. Failure to allow the current to discharge fully can cause severe electrical shock to service personnel.

The initial electrical test of a cable provides engineering data on the electrical characteristics of the cable insulation, and proves conclusively that no damage has occurred to the cable during shipping and installation. This proof test can serve as the acceptance test of the cable installation.

Electrical maintenance testing on a regular basis provides an excellent means to observe system insulation deterioration by detecting incipient cable failure or gradual deterioration trends. Most cable manufacturers recommend the high voltage tests be conducted at intervals of three to five years depending on the field conditions and history of the cable. E&S

Figure 3: Typical leakage current vs. voltage curves for phases A, B and C. When maximum test voltage is reached, the voltage is held for 15 minutes, recording the leakage current vs. the time in minutes.



97 Named for Promotion to Rank of Captain

Eighty-one civil engineering and 16 services officers have been named for promotion to captain. Some general, significant characteristics of the new engineering selectees are 89 percent were reserve officers; 15 percent had completed Squadron Officers School (SOS); 17 percent have master's degrees and a total of 26 percent had education above a bachelor's degree.

The engineering officers include:

Arnold, Walter A.
Avery, Roger L.
Barnhill, Gale A.
Barnhill, Henry P.
Bass, William J.
Baumgartel, Gary P.
Becker, Harold L., Jr
Best, Eugene S.
Biecrk, William J., Jr
Brooks, William R.
Brown, Robert W.
Bunner, Randle K.
Canfield, Karlin J.
Casolori, Bruce L.
Cawthon, William M.
Copeland, Jerry L.
Cornelius, Richard A.
Coullahan, Patrick M.
Custer, Kenneth S.
Dillaplain, John C.
Dzwilewski, Peter T.
Esperschade, John P., Jr
Estes, John H., IV
Fisher, William R.
Fogleman, Dean G.
Foster, Steven R.
Franklin, Benjamin J.
Frederick, Patrick D.
Gardner, Philip D.
Germain, Stephen P.
Glenn, Terry A.
Glidewell, Donnie D.
Guy, Homer L.
Hagelberg, Wayne H.
Hauck, Louis F.
Heiss, Charles P.
Henkel, Douglas K.
Holmes, Vernon I.
Holt, James R.
Ibarra, Guillermo
Irving, Robert T.
Isaacs, Larry K.
Janke, Warren R.
Johnson, Larry V.
Jones, John A.
Joyce, John
Kenna, Thomas M.
Kukuk, Steven D.
Kuse, Wayne C.
Legrand, Philip J.
Lowas, Albert F., Jr
Maness, William T.
Manning, Russell T.
McCullough, James E.
McKim, Michael L.
McWeeney, John J.
Miller, Edward L.
Moe, Timothy J.
Monts, John D.
Murphy, Donald E.
Pelich, William J., II
Rakaskie, Dean A.
Repaal, Douglas L.
Riggs, Thomas M.
Ritenour, Donald L.
Root, William L.
Rose, George S.
Rosenzweig, Alan D.
Rychecky, Jack A.
Scott, Charles W.
Shalonis, Paul J.
Sherwood, Steven C.
Sinkfield, Ralph R.
Smith, William H.
Spangler, James M.
Thury, Dennis L. W.
Urquhart, Charles T., III
Waits, Larry K.
Welker, Louis S.
Wentland, Barry R.
Wypiszynski, Steven

General characteristics of the services officers are 31 percent had completed SOS; 13 percent had education above a bachelor's degree and 87 percent were reserve officers.

The services officers include:

Beckett, Edward J.
Bianco, Louis G.
Bossen, Dennis A.
Eagan, Patrick D.
Erle, Carol A.
Henthorn, Charles R.
Hopkins, John D.
Humphries, William H., III
Johnson, Craig A.
Kelly, Walter T.
Kennedy, Frederick C.
Larsen, William K.
Lowder, Charles W.
Patrick, Nicholas
Schonder, Pamela A.
Smith, McBurnett J., Jr

Palace Blueprint

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PROFESSIONAL MILITARY EDUCATION (PME)

Excellent improvement in this area has been achieved but much remains to done, **Figure 2.**

EXPERIENCE

Measuring experience is a difficult task. The number of months in an AFSC, number and type of jobs an officer has had, level and breadth of assignments, fully qualified AFSC, etc., could be measurements. However, let's use a simple indicator: the percent of officers, by grade, that possesses a fully qualified AFSC in 1975 versus 1969, **Figure 3.**

SUMMARY

Today, we are accomplishing total force planning by utilizing a systems approach. We consider, analyze, determine, and/or manage such factors as number of accession (by engineering discipline), actual and desired retention rates, actual and desired loss rates by year group, rated supplement goals, force experience stem, and functional flows in/out of Civil Engineering, including duty AFSC changes. We study scenarios and force program documents to determine contingency capability including Reserves and National Guard augmentation and, of course, watch for possible manning problems.

Six years after inception, we feel the PALACE team concept has been highly successful. This does not mean that we make everyone happy all the time. We cannot send the majority to a warm climate area. or to a job that they perceive as the only one that maximizes their career progression or promotion potential, or to move an officer to another CONUS base because he has a personality conflict with a supervisor, plans for retirement in a specific area, or just feels it's time to move. However, the two-way communication between you and our team does allow you to express your desires and have them considered.

We are very proud of the fact that the civil engineering officer force stands ready to meet its global responsibilities and at the same time is a viable resource, developing its executives and leaders for the future. Many individuals have contributed to our career management program. We look forward to working with you in the future. Let's pull together and continue to improve our blueprint for officer career management and the ability of civil engineering to meet its global, "teeth" mission. C&S

Solid Waste Management

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In summary, the solid waste disposal problem which faces our affluent society is far from solution. Managers in government at all levels are becoming more and more aware that solutions must be found in the near future. The active role by the Federal government through EPA and by private industry to find solutions is encouraging.

What is not encouraging is the hesitancy of communities and Federal agencies to step forward and implement new techniques as they arrive in the marketplace. Also, the strong legislative action needed to induce procurement of products containing recycled materials, and in turn, ensure a more stable market for recovered materials, is slow in coming.

The high costs and capital investments which seem to be the inhibiting factor in resource recovery can be overcome by intergovernmental cooperation with local governmental units by sharing costs and simultaneously amassing the quantity of solid waste necessary to make resource recovery cost-effective. For a Base Civil Engineer to make this approach work, a great deal of initiative and patience is required because his only source of funds for capital investment is the Military Construction Program and he may have to make the first suggestion for such a concept to local government authorities.

On a larger scale, an alternative method would be a national policy requiring states to establish service districts and construct transfer stations and recovery systems to handle the increasing volume of solid waste. This regional approach should have contiguous boundaries with other intergovernmental agencies, e.g., Councils of Government, Regional Governments, to preclude further proliferation of special districts. Where Federal facilities are involved, such as air bases, capital expenditures should be equitably distributed between the Federal and local governments with emphasis on facilitating ease in Federal participation and acquisition of funds. This can only come about through Congressional legislation, but if implemented the step will be in the right direction.

Regardless of what system is finally adopted, one is urgently needed for our nation in order to truly put 'management' in solid waste management. Base Civil Engineers can assist in this by being informed about current solid waste management practices and by being prepared to actively participate in intergovernmental solid waste disposal and resource recovery systems. C&S

WORTH NOTING

Organizations Can Now Increase Their Distribution to Quarterly

Beginning with this issue of the **Air Force Engineering & Services Quarterly,** members of the engineering and services family can **now request increased distribution** of this periodical, if they qualify.

Under guidelines recently established, requirements are based on a distribution ratio of one copy for every five individuals. For example, if your engineering and services organization has 125 persons, then it qualifies for 25 copies.

Administrative officials within engineering and services organizations worldwide who are responsible for ordering publications within their respective organizations should contact their installation's Publications Distribution Office (PDO) to make their new requirements known. Officials must complete AF Form 764A and submit it to the PDO who in turn will process the form, guaranteeing increased distribution.

It is imperative that all organizations review their requirements, and if they qualify for an increase based on the distribution ratio of one copy for every five individuals, they must make their new requirements known to the PDO **as soon as possible.** Processing of requirements takes time and the sooner completed, the sooner your organization will receive its fair distribution.

14 Engineering & Services Officers Named for Intermediate Schools

Thirteen Air Force Civil Engineers and one Services officer have been named to attend intermediate service schools, it was announced recently by Headquarters US Air Force.

The following six civil engineers have been scheduled to attend Air Command and Staff College in August 1976: Maj Lawrence J. Klumas; Maj Marshall W. Nay, Jr; Maj Tom V. Purser; Capt Ronald Lebert; Capt Keith H. Manning; and Capt Anthony P. Pyrz.

Two engineers and one services officer have been selected to attend the Armed Forces Staff College in August 1976. The civil engineers include Capt Robert R. Grant and Capt Philip H. Schaefer. The services officer is Maj Arnold G. Drill.

Five civil engineers have been scheduled to attend the Armed Forces Staff College commencing in January 1977. They are Maj Thomas D. Hovey; Maj Thayne H. Judd; Maj Bostus D. Massey; Capt Michael J. Lynch; and Capt Warren L. Page.

44 Named for Promotion to Rank of Lieutenant Colonel

Headquarters US Air Force has announced the promotion of 43 civil engineer and one services officers to the rank of lieutenant colonel. Because of space problems at deadline time for this issue, general characteristics concerning this promotion cycle will be published in the August issue. Primary zone selectees are:

Robert L. Allen; George D. Ballentine; Andrew S. Bobek; James L. Clowers; Carl L. Davidson; Kenneth C. Franzel; James W. Garbart; Larry G. Garrison; Mario B. Ginnetti; Harry W. Glaze; Frederick W. Henss; Bradley H. Hooper; Thaddeus F. Jacoviak; Bruce W. Johnson; Earl H. Jones, Jr; Roger G. Kaul; Floyd V. Kimberly; Richard F. Kirt; Ernest R. Lenart, Jr; John T. Lenihan; Thomas E. Lollis.

Philip L. Madden; Randolph V. Matalucci; Charles H. Neubauer; William G. Niemantsverdrift; Joseph B. Ornowski, Jr; Roger K. Poliock (services); Charles W. Pomeroy; David P. Ray; George A. Romero; Valerio A. Santos; William E. Schaal; Ray D. Schwartz; Jerry A. Smith; Robert W. Sullivan; Attwood F. Thornton; Walter T. I. Whitman; David D. Wozniak and Eldon W. Zeller. Secondary zone selectees are James L. Baushke; Curtis K. Bayer; Robert G. Gilbert; Allan J. Sailer; and Duane J. Wray.

Setting It Straight

A typographical error in the February 1976 issue of the **Quarterly** was not caught until after the issue was published. On page 13 of that issue under the headline Promotions, it was published under the description of general characteristics of colonel selectees that "All have completed senior services schools and are registered Professional Engineers." The sentence should have read "All have completed at least squadron officers school, and at least half have completed senior service schools and are registered Professional Engineers." Our apologies.

Walter Will Gen Thompson
Meritorious Achievement

Capt Gorges Gen Thompson
Meritorious Achievement

Award Presentations Highlight Engineers Week Affair

Unusual firsts dominated award presentations at the Air Force Engineering and Services Luncheon at the Bolling AFB Officers Open Mess in observance of National Engineers Week in February.

Engineering and Services personnel recognized for special achievement awards include:

• **Walter Will**, Command Liquid Fuel Facilities Engineer, DCS/Engineering and Services, Headquarters US Air Forces in Europe: **Meritorious Achievement Award for Professional Excellence (civilian).** Mr Will was cited for his outstanding professional skill, leadership and success in management of POL construction programs to provide vitally needed facilities for the Air Force mission in Europe. In awarding the plaque to Mr Will, General Thompson noted that this presentation marked the first time in the history of the Directorate that a non-US citizen was named the recipient of the award. Mr Will is a German National who has been employed by the Air Force for over 25 years.

• **Capt Thomas W. Gorges**, 379th Civil Engineering Squadron, Wurtsmith AFB, Michigan: **Meritorious Achievement Award for Professional Excellence (military).** Captain Gorges was honored for the exceptional manner in which he obtained outstanding results in management, programming and squadron ethical practices at Wurtsmith AFB. He also was cited for the successful implementation of the management by objectives techniques in an innovative way, tailoring it to the needs of his Squadron.

• **MSgt James W. Smith**, 3rd Civil Engineering Squadron, Clark AB, Phillipines: **Non-Commissioned Officer of the Year.** Sergeant Smith was recognized for his service in several important positions within the Squadron: Foreman of the Pavements Work Center, Prime BEEF Non-Commissioned Officer-in-Charge, and Base Locksmith. In each of these positions, Sergeant Smith demonstrated initiative, job knowledge and professionalism.

• **Sanford M. Cooke**, Roanoke Rapids AFS, North Carolina: **Foreman of the Year Award.** Mr Cooke was honored for his initiative and leadership abilities by demonstrating rare technical and administrative competency that resulted in a totally productive work force. Mr Cooke could not attend the luncheon and it was announced that his award would be presented to him at a later date.

• **Capt Michael A. Burrill**, 8th Civil Engineering Squadron, Kunsan AB, Korea: **Maj Gen A. M. Minton Award.** This award honors the author of the best article published in the **Air Force Engineering & Services Quarterly** during the past calendar year. It is sponsored by the Aerospace Education Foundation of the Air Force Association (AFA) which has presented the award since 1960.

Captain Burrill was selected for his article "Good Houses for Unknown Clients" which appeared in the May 1975 issue of the **Quarterly.** Mr. James H. Straubel, Executive Director of the AFA, presented the plaque to the officer's wife, Marilyn. She accepted for her husband who could not attend the affair.

NCO of the Year
MSgt Smith Gen Thompson

Minton Award
Mrs Burrill Gen Thompson

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